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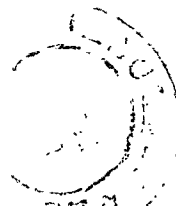
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METHOD VERSUS SUBSTANCE: HOW STRONG ARE UNDERLYING RELATIONSHIPS BETWEEN JOB CHARACTERISTICS AND ATTITUDINAL OUTCOMES?

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This study compared the relative strengths of the effects of method versus substance on relationships between job characteristics and attitudinal outcomes. Reports from both job incumbents and nonincumbents on job characteristics and job attitudes were compared for 509 employees of four organizations. Substantive relationships were observed between job characteristics and effort, supporting the job characteristics model. Common method effects, however, inflated relationships between job characteristics and affective outcomes, thereby supporting the social information processing model. Implications are discussed for other areas of organizational research that rely on single data sources.

The spectre of common method variance artifactually inflating substantive relationships haunts many areas of organizational research. The issue is particularly problematic when all or most relevant data are obtained from one source, such as a self-report questionnaire (Mitchell, 1985). Critiques of single-method research designs have raised serious doubts about the substantive results in studies of organizational technology and structure (Fry, 1982; Pennings, 1973; Sathe, 1978), strategy and product life cycle (Ramanujam & Venkatraman, 1984), task design (Aldag, Barr, & Brief, 1981; Griffin, 1982; Roberts & Glick, 1981; Salancik & Pfeffer, 1978), and others. The prevalence of single-method research designs raises some critical questions. Are observed relationships among significant variables solely attributable to common

Contributions to this paper are not reflected by order of authorship. Data for this study were collected under Grant No. 92-26-72-35 from the U.S. Department of Labor to the University of Michigan. Researchers undertaking such projects under government sponsorship are encouraged to express their own judgment. Interpretations or viewpoints stated in this paper do not necessarily represent the official position of the Department of Labor. Much of the work for this paper was completed while the second and third authors were at the University of Texas at Austin and the Southwest Educational Development Laboratory, respectively. An earlier version of this paper received the Best Competitive Paper Award from the Organizational Behavior Division of the Academy of Management in Dallas, 1983.

method variance? How much are underlying relationships inflated by the use of a single source of data?

This study addresses these and similar questions with respect to an area of organizational research that has come under particularly heavy criticism for relying exclusively on self-reports. Specifically, we used multiple sources of data in a field setting to assess the relative strengths of method effects versus substantive associations between job characteristics and attitudinal outcomes. This research applies the strategy of modeling with structural equations, which promises to be a useful analytical strategy for all areas of organizational research (Bagozzi & Phillips, 1982). Application of this methodology to job design is particularly useful because the issue of method versus substance has matured beyond a simple concern with methodological artifacts (Sudman & Bradburn, 1974) into a strong theoretical debate with competing theoretical formulations (Hackman & Oldham, 1976, 1980; Roberts & Glick, 1981; Salancik & Pfeffer, 1978). When researchers first detect or suspect method effects, they typically discuss them in concrete, methodological terms such as the use of a single procedure for collecting data, similar formats and contents of items, and situational similarities (Fiske, 1982). At a more abstract level, a method effect may be interpreted in terms of response effects like biases toward socially desirable, lenient, or affirmative responses, and halo effects (Sudman & Bradburn, 1974). The current debate in research on job design, however, emphasizes theoretical interpretations of method effects associated with data supplied by job incumbents.

THEORETICAL FRAMEWORKS

The *job characteristics approach* is a dominant theoretical framework for explaining empirical relationships between job characteristics and outcomes (Hackman & Lawler, 1971; Hackman & Oldham, 1975, 1976, 1980.) This approach posits that perceived job characteristics and the strength of growth needs have multiplicative effects on motivation, job satisfaction, and other attitudinal outcomes. In this approach, objective job characteristics primarily determine perceived job characteristics, but an employee's redefinition of a job may cause discrepancies between perceived and objective job characteristics (Hackman & Oldham, 1980). Hackman (1969: 101, 1970), for example, argued that an individual routinely "redefines" a task or job to be consistent with his or her needs, goals, and values before performing it. Task redefinition may be cognitive, so that objective job characteristics are not changed but merely distorted, and an incumbent experiences more desirable characteristics. It may also be actual, with an incumbent introducing more of a given characteristic to a job in ways that may not be apparent to outside observers. In addition, Alderfer (1972) proposed that an incumbent who desires more of a given task characteristic may be more adept at exploiting that characteristic and can therefore experience more of it.

The job characteristics approach has generated an impressive quantity of generally supportive research (Hackman & Oldham, 1980; Roberts & Glick,

1981). It has also been scrutinized by researchers asserting that observed relationships between job characteristics and attitudinal outcomes could be explained through common method effects rather than through substantive associations between the two sets of variables. Roberts and Glick (1981), for example, noted that most studies offering empirical support for the job characteristics framework used self-report measures of both job characteristics and attitudinal outcomes; furthermore, items measuring these constructs had similar wording and response formats. Potential substantive processes underlying these common method effects include cognitive consistency (Roberts & Glick, 1981), social comparison processes (Festinger, 1954; Zajonc, 1968), social construction of reality (Berger & Luckman, 1967; Weick, 1979), self-perception (Bem, 1972), and commitment (Keisler, 1971; Salancik, 1977).

The *social information processing approach* (Salancik & Pfeffer, 1977, 1978) and related empirical investigations (Blau & Katerberg, 1982; Griffin, 1982; Thomas & Griffin, 1983) have examined these processes in detail. This approach emphasizes the role of social context and the consequences of past choices in the formation of an individual's attitudes. It argues that commitment processes, the saliency and relevance of available information, and the need for self-justification largely determine people's descriptions of their jobs as well as their attitudes about these jobs. Thus, the social information processing approach hypothesizes that (1) perceived job characteristics and affective responses are related to each other primarily because they share antecedent cognitive and social processes; (2) these effects may be reflected in common method variance (Roberts & Glick, 1981); and (3) objective job characteristics are only marginal determinants of both perceived job characteristics and employee responses.

Although the social information processing approach was introduced as an alternative to the job characteristics approach, the two perspectives have some similarities. Both recognize that individual cognitions and objective job characteristics affect employees' perceptions of their jobs and their responses to job characteristics. Both perspectives also posit a direct link between perceived job characteristics and outcomes. Thus, both theories allow for the existence of some level of common method variance and some level of association between job characteristics and job outcomes. The theories differ primarily in their relative emphases. The social information processing approach stresses social and cognitive processes that are likely to result in strong method effects when there is heavy reliance on self-report data. The job characteristics approach, however, stresses objective job characteristics as the major antecedents of relevant perceptions and responses. Although employees may redefine their jobs, the job characteristics approach predicts only minor method effects when data are primarily self-reported. Thus, the relative importance of methods versus substance in relationships between job characteristics and job outcomes has clear alternative theoretical interpretations.

EMPIRICAL EVIDENCE

The introduction of social information processing as an alternative to the job characteristics approach immediately stimulated studies adopting experimental rather than survey research methods (e.g., Griffin, 1983; O'Reilly & Caldwell, 1979; Weiss & Shaw, 1979; White & Mitchell, 1979). Although the relative magnitude of effects varied, these experiments showed that both manipulated job characteristics and manipulated social cues have significant effects on incumbents' perceptions of their jobs. Because these studies relied heavily on experimental designs, however, a clear determination of the superiority of either approach to job redesign is difficult. A major difference between the job characteristics and social information processing approaches involves the relative importance of actual job characteristics versus social and cognitive processes in the population of jobs. Experimental manipulations, however, typically include only high and low levels of job characteristics and/or social cues. By inflating or deflating the differences between experimental conditions, an experimenter can control the relative strengths of observed effects. Therefore, a preferred strategy for contrasting the two perspectives requires capturing the variations in job characteristics and social cues in the population of jobs.

Field studies that sample a wide diversity of jobs and measure job characteristics with multiple methods provide better research designs for comparing the relative validity of the two approaches than do studies with a narrow range of jobs (Mitchell, 1985). Such studies use company records and independent raters, such as supervisors and trained observers, to rate characteristics of a broad array of jobs (Algera, 1983; Brass, 1981; Brief & Aldag, 1978; Gould, 1979; Hackman & Lawler, 1971; Hackman & Oldham, 1975; Hill, 1975; Jenkins & Nadler, 1977; Jenkins, Nadler, Lawler, & Cammann, 1975; Quinn, 1977). Only five of these studies reported relationships between job characteristics rated by nonincumbents and outcomes (Algera, 1983; Brief & Aldag, 1978; Gould, 1979; Hill, 1975; Quinn, 1977). Of these, three found such relationships to be significant (Algera; Gould; Quinn).

Overall, field studies using assessments of job characteristics by nonincumbents have provided stronger support for propositions derived from the job characteristics approach than for propositions derived from the social information processing approach. But investigators assessed method effects in these studies only through simple comparisons of correlations or non-hierarchical regressions. Although these findings are illuminating, this previous empirical work does not provide competitive tests of propositions derived from the two theories.

PRESENT APPROACH

A key question differentiating the job characteristics and social information processing approaches to task design is whether relationships between job characteristics and attitudinal responses are attributable primarily to

substantive associations or to common method effects; therefore, an empirical examination of the relative accuracy of predictions from these approaches ideally should entail competitive tests of these alternative propositions (James, Mulaik, & Brett, 1982; Roberts, Hulin, & Rousseau, 1978). In addition, such an empirical comparison should meet several other criteria. It should (1) examine data on job characteristics and outcomes simultaneously, (2) obtain these data from both job incumbents and nonincumbents, and (3) employ a sample of jobs representing naturally occurring variations across actual jobs. We designed this study to meet these criteria. As in most competitive tests of complex theories, however, our empirical comparison is limited to contrasting predictions from the two theories regarding one key aspect: the relative importance of method versus substance in relationships between job characteristics and attitudinal outcomes. Discovery of a substantive association between job characteristics and outcomes would confirm predictions of the job characteristics approach. Discovery of common method effects, on the other hand, would validate Roberts and Glick's (1981) criticism of job characteristics research and provide evidence for the existence of the dynamics of social information processing.

METHODS

Data were obtained from 631 respondents in four organizations: two automotive parts manufacturers, a printing company, and a large university hospital from which four departments participated. Two organizations were unionized. The respondents held varied types of jobs and as a group were reasonably similar in occupational constitution to a national sample of workers (Quinn & Shepard, 1974).¹ Seventy-five percent of the respondents had completed high school; 83 percent were white; 51 percent were men; and 69 percent were married. Their median age was 32 years.

Method Factors

We defined three method factors by three separate data sources: interviews, card sorts, and observations. Interviewers collected initial data from respondents during 90-minute sessions that occurred off the job, generally in respondents' homes. A variety of data collection techniques figured in these sessions, including interviews and card sorts. Of the 631 individuals who participated in interviews (a response rate of 75.4 percent), 564 also participated in observations; complete data on all variables of interest were obtained for 509 respondents. The Appendix gives the content of each item used in this study, item numbers used to represent each, the construct it represented, and its data source, number of response options, and directionality.

Interviews. Professional staff from the University of Michigan Survey Research Center read a series of structured interview questions to respon-

¹ Arranged into Census Occupational Classifications (U.S. Bureau of the Census, 1971), most jobs fell into six major categories: operative (25.1%), clerical (16.7%), professional/technical (15.7%), service (12.0%), craftsmen/foremen (14.9%), and managers/officials (10.0%).

dents and recorded their responses on the data collection instrument during the initial off-the-job collection sessions.

Card sorts. Interviewers administered card sorts during the same sessions. For this data source, respondents sorted question cards into piles representing different response categories.

Observations. Two or more trained observers from the Survey Research Center² observed cooperating respondents on the job for about an hour on two different occasions. In all, over 1,500 hours of observation were completed. We generated the observational data used in this investigation by averaging the independent observations taken at different times by different observers. Further details on data collection procedures can be obtained in a report from the Survey Research Center (1977).

Constructs

The analysis included 48 items representing five constructs pertaining to job characteristics, three constructs pertaining to outcomes, and three method factors. Table 1 gives descriptive statistics and intercorrelations among the items.

The job characteristics approach hypothesizes that strength of growth needs moderates relationships between job characteristics and outcomes (Hackman & Lawler, 1971; Hackman & Oldham, 1976, 1980). Because all respondents were uniformly high on growth need strength, we did not include it in these analyses as a moderator.³

Job characteristics constructs. Five job characteristics were selected from the data sources for this study. Hackman and Lawler (1971) used four of these characteristics in their classic study: variety, autonomy, task identity, and task feedback. Our specific operational definitions of these constructs differed slightly from those Hackman and Lawler used. We included a fifth characteristic, required skills and abilities, as a measure of job complexity.

Items measuring job characteristics were obtained from card sorts and observations. The card sorts asked respondents to rate how true various statements were of their jobs, using response categories ranging from "not at all true," coded 1, to "very true," coded 4. The majority of the items measuring job characteristics in the observation instrument used 6-point formats ranging from "very untrue," coded 1, to "very true," coded 6. The remaining observation items had 7-point rating formats similar to those used by Hackman and Lawler (1971).

² For details on training procedures for observers and measures of interrater agreement and temporal stability, see Jenkins and colleagues (1975).

³ Eight interview items asked respondents how desirable it was to have various characteristics on their jobs, with responses ranging from "not at all desirable," coded 1, to "very desirable," coded 4. A sample item is: "How desirable to you is it that you get a sense of accomplishment from your job?" For the 509 respondents in this study, the mean of the eight averaged items was 3.71, the standard deviation was .355, and the coefficient alpha was .79. Given the very high mean value and small variance, all respondents were judged to have strong growth needs. Fuller details on the measure of growth need strength are available in a report from the Survey Research Center (1977).

Outcome constructs. The analysis included three outcome constructs: general satisfaction, challenge satisfaction, and effort. General satisfaction was measured through interviews and observations. Interviews included five facet-free items measuring satisfaction that were originally used by Quinn and Mangione (1973). Observers measured general satisfaction in two ways. After rating how often employees smiled, laughed, daydreamed, yawned, got angry, and so forth, observers reported how satisfied they thought employees were with their jobs, using a 4-point rating format. They also rated employees' general satisfaction on a 7-point semantic differential scale. Items measuring challenge satisfaction were derived from card sorts and observations. The card sorts contained six items, originally used by Quinn and Mangione (1973), that asked respondents how satisfied they were with challenge provided by their jobs. These items had 4-point response formats ranging from "not at all satisfied," coded 1, to "very satisfied," coded 4. Observations contained two items using 7-point semantic differential scales to measure challenge satisfaction. Interviews and observations provided data on effort. Three measurements of effort specifically developed for the study were elicited through interviews. Observations provided two items that required observers to assess how hard respondents worked on their jobs.

Analysis Strategies

As noted earlier in this section, the analyses used 48 items representing three method factors and eight theoretical constructs. In all analyses, we treated the five job characteristics separately rather than combining them into a composite index. This represents a slight but commonly accepted departure from the job characteristics approach (Hackman & Oldham, 1980).

Two analysis strategies were used, multiple regression and structural equations. Using regression analyses provided a point of comparison with previous research on the job characteristics approach but involved certain limitations. These included the necessity of assuming that the independent variables contained no measurement errors and that there were no method effects. In addition, the regression analyses lack statistical tests comparing the strength of effects across data sources. The second set of analyses, the structural equations, did not suffer from these limitations.

Multiple regressions. Three sets of indices were created for each predictor variable. First, we averaged information supplied by respondents through interviews and card sorts for each predictor construct to provide respondent-supplied indices. Second, we averaged information obtained from observations for each predictor construct to derive observer-supplied indices. Finally, we averaged information from all data sources to yield pooled (respondent- and observer-supplied) indices. Likewise, we developed respondent-supplied, observer-supplied, and pooled indices for the three outcome constructs, general satisfaction, challenge satisfaction, and effort. This procedure yielded three measures for each of the three outcome constructs and three measures for each of the five predictor constructs. The reliability for each of these 24 scales was computed and found to be acceptable. Adopting the conventional

TABLE 1
Means, Standard Deviations, and Correlations among Job Characteristics and Job Outcome Items^{a,b}

Constructs	Item Codes	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
General satisfaction	1	3.26	.77																					
	2	2.40	1.45	-.46																				
	3	4.16	1.25	.50	-.44																			
	4	4.17	1.22	.50	-.38	.58																		
	5	3.52	1.89	-.31	.30	-.31	-.28																	
Challenge satisfaction	6	4.58	1.11	.18	-.14	.16	.18	-.14																
	7	1.80	.57	-.20	.17	-.17	.17	.11	-.79															
	8	2.82	1.02	.48	-.38	.30	.32	-.26	.31	-.29														
	9	3.17	.97	.57	-.34	.33	.38	-.35	.32	-.31	.58													
	10	3.35	.79	.43	-.27	.31	.31	-.23	.19	-.19	.42	.40												
Effort	11	2.93	.93	.33	-.33	.31	.36	-.28	.27	-.20	.62	.63	.51											
	12	3.01	.33	.29	-.13	.16	.22	-.13	.12	-.07	.34	.33	.40	.41										
	13	3.22	.84	.40	-.34	.26	.29	-.21	.20	-.18	.43	.46	.46	.50	.38									
	14	4.37	1.27	.14	-.11	.11	.17	-.16	.89	-.77	.30	.31	.18	.27	.12	.19								
	15	3.60	1.12	-.19	.13	-.17	-.20	.16	-.85	.74	-.34	-.34	-.21	-.25	-.11	-.85								
Task identity	16	2.02	1.33	-.22	.09	-.11	-.12	.07	-.14	-.09	-.16	-.24	-.24	-.22	-.15	-.17	.14							
	17	3.67	1.05	-.06	.06	-.04	-.10	.00	.17	-.16	.03	.04	.00	.01	-.02	.01	-.14	.14						
	18	3.24	.80	.10	-.06	.02	.08	-.04	.24	-.22	.07	.13	.18	.16	.08	.03	.27	-.26	-.13					
	19	4.80	.98	.09	-.11	.07	.04	-.12	.11	-.12	.08	.08	.03	.05	.05	.08	.18	-.17	-.21	.23				
	20	4.23	.80	.04	-.06	.05	.00	-.10	.15	-.14	.06	.05	-.04	.04	.03	.07	.22	-.19	-.22	.14	.11	.82		
Complexity	21	3.13	.92	.25	-.16	.15	.15	-.19	.10	-.16	.27	.32	.28	.23	.19	.07	.13	-.16	-.17	.06	.13	.16	.13	
	22	3.34	.81	.15	-.13	.12	.17	-.09	.05	-.07	.17	.20	.22	.19	.14	.30	.05	-.06	-.09	-.10	.05	.03	-.01	.40
	23	3.81	1.38	.02	-.07	.09	.15	-.08	.58	-.52	.21	.24	.22	.22	.12	.14	.62	-.58	-.01	.09	.20	-.06	-.11	.12
	24	4.11	.84	-.02	-.08	.04	.10	.03	.24	-.28	.14	.07	.11	.11	.07	.06	.24	-.24	.03	-.04	.06	.00	-.06	.08
	25	3.92	.82	-.05	-.03	.04	.10	-.01	.27	-.31	.14	.07	.08	.11	.04	.05	.27	-.26	.01	.02	.07	-.02	-.03	.09
Task feedback	26	3.21	1.06	.25	-.16	.23	.25	-.13	.33	-.32	.42	.44	.17	.32	.16	.25	.34	-.38	-.22	.11	.11	.01	.07	.23
	27	2.90	1.05	.16	-.16	.13	.19	-.10	.47	-.43	.41	.41	.20	.33	.21	.27	.50	-.48	-.24	.13	.20	.09	.13	.19
	28	3.06	1.05	.20	-.16	.12	.20	-.10	.42	-.36	.42	.39	.19	.32	.21	.24	.44	-.43	-.26	.15	.20	.11	.13	.26
	29	3.67	1.58	.08	-.05	.14	.15	-.07	.69	-.61	.26	.26	.19	.23	.17	.13	.77	-.74	-.08	.20	.27	.15	.17	.13
	30	3.27	1.54	.09	-.07	.14	.15	-.08	.74	-.65	.28	.29	.19	.23	.15	.15	.80	-.77	-.09	.19	.27	.12	.14	.16
Variety	31	3.28	1.29	.09	-.07	.13	.14	-.07	.70	-.64	.27	.26	.20	.22	.15	.13	.76	-.77	-.10	.19	.27	.14	.17	.14
	32	3.48	1.37	-.10	.07	-.13	-.16	.09	.71	.63	-.26	-.28	-.21	-.23	.13	-.15	.77	.75	.12	-.17	-.28	-.12	-.15	-.14
	33	3.04	.95	.21	-.26	.20	.22	-.16	.06	-.08	.27	.27	.24	.25	.14	.33	.02	-.05	-.12	-.08	-.10	-.01	-.04	.20
	34	4.69	.93	.05	-.03	.03	.01	.10	.16	-.20	-.03	-.02	.04	.00	-.02	.05	.18	-.13	-.06	.10	.13	.17	.17	.05
	35	4.26	.63	-.04	.01	-.01	.02	.07	.05	-.09	-.05	-.05	.17	-.06	-.03	.04	.08	-.02	-.06	.04	.10	.22	.18	.00
Autonomy	36	4.04	.81	.05	-.09	.05	.12	-.03	.34	-.33	.18	.15	.14	.14	.10	.05	.34	-.33	-.05	.02	.24	-.05	-.10	.10
	37	3.17	1.02	.27	-.11	.21	.27	-.15	.30	-.25	.32	.42	.24	.32	.19	.30	.34	-.31	-.18	.07	.13	.09	.11	.12
	38	2.79	1.11	.16	-.12	.13	.10	.12	.31	.27	.29	.29	.12	.26	.12	.12	.35	.32	.04	-.07	.08	-.10	-.12	-.04
	39	3.41	1.43	.09	-.06	.13	.15	-.09	.74	-.65	.24	.27	.16	.22	.09	.11	.79	.73	-.05	.19	.27	.04	.08	.11
	40	4.08	1.15	-.08	.06	-.12	-.15	.11	-.72	.64	-.25	-.27	.16	.20	.06	.10	.76	.71	.05	-.14	-.25	.01	-.02	-.09
	41	3.22	1.20	.07	-.08	.11	.14	-.11	.70	-.63	.27	.27	.16	.20	.06	.10	.76	.72	.04	.17	.27	-.01	.03	.09
	42	2.85	1.08	.22	-.24	.18	.19	-.09	.38	-.32	.38	.33	.35	.31	.22	.27	.37	-.40	-.11	.12	.26	.00	.00	.30
	43	2.93	1.08	.24	-.17	.18	.21	-.12	.38	-.33	.37	.34	.38	.32	.26	.26	.37	-.39	-.14	.11	.24	.00	.00	.22
	44	3.16	.90	.27	-.14	.20	.22	-.14	.20	-.19	.27	.27	.50	.35	.22	.31	.22	-.20	-.15	.01	.11	.01	.01	.25
	45	3.86	1.58	.08	-.08	.13	.14	-.07	.70	-.65	.24	.26	.19	.20	.08	.13	.73	.70	-.03	.19	.25	-.07	-.05	.13
	46	3.47	1.27	.05	-.09	.12	.13	-.10	.70	-.65	.27	.27	.21	.21	.08	.13	.74	.71	-.05	.17	.24	-.03	.02	.13
	47	3.44	1.22	-.09	.07	-.08	.12	.09	-.68	.63	-.27	-.25	-.20	-.19	-.06	-.13	.71	.68	.04	-.14	-.26	.05	.04	-.11
	48	3.75	1.10	.09	-.07	.09	.15	-.10	.67	-.64	.26	.27	.20	.20	.08	.15	.68	-.67	-.06	.16	.25	-.09	-.05	.14

TABLE 1 (continued)

Item Codes ^c	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
23	06																									
24	00	51																								
25	-01	52	79																							
26	11	28	09	10																						
27	17	39	20	20	57																					
28	16	35	15	15	52	68																				
29	02	68	28	28	39	51	47																			
30	06	70	28	29	39	51	47	92																		
31	00	68	30	32	38	49	46	95	92																	
32	-03	-70	-29	-31	-38	-50	-48	-94	-90	-94																
33	28	01	-02	-03	26	24	24	00	02	01	01	-05														
34	-06	26	34	35	06	14	11	27	21	26	-29	-02														
35	-10	13	33	32	01	06	03	14	07	14	-16	-02	69													
36	01	56	54	50	15	25	24	40	39	42	-41	-01	39	36												
37	11	24	18	22	43	41	40	26	29	24	-25	16	09	09	13											
38	09	-19	-09	-13	-28	-20	-18	-33	-34	-32	33	-04	-05	-01	-10	-30										
39	05	70	29	33	37	46	42	81	85	81	-81	-01	20	04	36	30	-30									
40	-01	-66	-26	-32	-36	-44	-41	-78	-81	-78	78	00	-16	-02	-32	-30	34	-90								
41	01	71	30	35	36	45	42	80	84	80	-80	-01	18	05	41	29	-29	91	-91							
42	17	36	19	19	37	42	40	38	41	39	-38	23	-01	-08	28	28	-21	40	-37	38						
43	15	35	15	15	44	50	50	42	42	42	-44	24	08	01	24	36	-22	40	-39	39	59					
44	19	17	09	08	19	19	17	21	19	20	-21	17	-01	-06	14	22	-15	20	-18	17	36	44				
45	04	73	31	34	34	43	40	76	82	77	-77	02	16	01	34	28	-26	86	-84	85	42	42	19			
46	02	73	35	38	35	46	43	78	83	80	-80	05	17	03	37	27	-29	84	-84	85	43	44	19	92		
47	-03	-73	-34	-36	-35	-44	-45	-75	-80	-76	77	-04	-19	-05	-40	-27	26	-82	-83	-84	-41	-44	-18	-88	-90	
48	05	70	36	40	33	43	43	70	76	72	-72	04	17	04	42	27	-26	78	-78	80	39	41	22	89	89	-87

^a N = 509^b Decimal points omitted from correlation coefficients.^c Items are identified in the Appendix.

treatment of measurement error, we therefore treated the scales as if they were error-free in the regression analyses.

The three indices for each of the outcome constructs were regressed separately on the three sets of predictor indices. Taking the outcome construct for general satisfaction as an example, nine regression equations were computed: respondent-supplied general satisfaction regressed separately on respondent-supplied predictors, observer-supplied predictors, and pooled predictors; observer-supplied general satisfaction regressed separately on respondent-supplied, observer-supplied, and pooled predictors; and pooled general satisfaction regressed separately on respondent-supplied, observer-supplied, and pooled predictors. We repeated this procedure for the indices of challenge satisfaction and effort. In all, 27 regression equations were estimated.

Visual comparisons of R^2 s from these nonhierarchical regressions provide a simple test of the extent to which relationships between job characteristics and employee responses are a function of the source of data. The job characteristics model predicts roughly equal R^2 s across data sources. In contrast, the social information processing model predicts stronger relationships using only respondent-supplied data.

Structural equations. Regression analyses were replicated in the analyses using structural equations with more explicit specifications and simultaneous estimations of hypothesized underlying relationships, method factors, and unexplained variance. Analyses using structural equations provide a more holistic approach than separate reliability and regression analyses (Bagozzi & Phillips, 1982). The analyses of structural equations provide estimates of the strengths of relationships among latent—underlying, unmeasured—variables. In order to estimate simultaneously the strengths of relationships among latent variables for job characteristics, outcomes, and method effects, we fitted five models to the observed correlation matrix using LISREL IV (Jöreskog & Sörbom, 1978). The decision to use correlations rather than covariances was based on Bagozzi's (1982) argument that analysis of correlations is more appropriate for comparing the effects of different variables within a data set.

Four models were developed to represent alternative explanations of the observed relationships between job characteristics and outcomes. In addition, the null model was specified for purposes of comparison. In the four substantive models, each of the 48 items was associated with only one theoretical construct. Furthermore, all five models were specified as confirmatory factor models. Both directions of causality between job characteristics and outcomes are theoretically plausible and cannot be disentangled in our cross-sectional data. Thus, relationships among latent variables are specified as reciprocal correlations rather than unidirectional causal paths.

Table 2 summarizes differences among the five models. The first model, model 0, is an extremely constrained null model with no relationships among the 48 observed variables and no latent variables. This null model is used solely for comparison (Bentler & Bonett, 1980; James et al., 1982). The first

TABLE 2
Differences in the Specifications of Models
Based on Structural Equations

Characteristics of models	Models				
	0	I	II	III	IV
48 observed variables	Yes	Yes	Yes	Yes	Yes
8 latent variables	No	Yes	Yes	Yes	Yes
3 methods factors: interview, card sort, and observation	No	No	Yes	Yes	Yes
Covariation among latent variables for job characteristics	No	Yes	No	Yes	Yes
Covariation among latent variables for job outcomes	No	Yes	No	Yes	Yes
Covariation between latent variables for job characteristics and job outcomes	No	Yes	No	No	Yes

substantive model, model I, represents the traditional approach in organizational research in which method factors are ignored or assumed to be irrelevant. Using this model, all observed correlations between job characteristics and outcomes are attributed to underlying relationships among the latent variables. The remaining three models include three method factors reflecting the three data sources—interviews, card sorts, and observations. Model II attributes all observed relationships among constructs to method effects, with no relationships among latent variables. Model III assumes that underlying relationships may exist within two groups of latent variables: those for job characteristics and for outcomes. This model, however, attributes any observed relationships between job characteristics and outcomes exclusively to method effects. The final model, model IV, attributes observed relationships between job characteristics and outcomes to both real, substantive associations and common method effects.⁴

In this study, the critical difference between the job characteristics and the social information processing approaches lies in the relative strengths of underlying relationships between job characteristics and outcomes independent of common method effects. The social information processing approach predicts that such relationships will be weak; the job characteristics approach

⁴ For all five models, errors associated with items are specified to be uncorrelated, with the exception of items 10 and 44, which are worded very similarly. Errors associated with these two items are allowed to correlate in models II, III, and IV. Method factors are defined as uncorrelated with the latent variables and with one another.

Additional method factors reflecting response formats and four additional correlated errors are identified a priori from a careful reading of the instruments. We did not include these in the final analysis, however, either because they failed to improve the empirical fit of a model, or because a model became underidentified. The final measurement model (model IV) is not modified by post hoc examination of derivatives, or by other techniques that tend to capitalize on chance.

predicts strong underlying relationships. The difference in these predictions can be examined best by comparing the strengths of underlying relationships among models I through IV. First, comparing the overall fit of model I versus that of model IV indicates whether the common method effects are significant. Second, a difference in the fits of model II and model IV would suggest that the underlying relationships among job characteristics and job outcomes are independent of common method effects. Contrasting models II and III will reveal the underlying relationships among job characteristics and among job outcomes. Finally, model III versus model IV indicates whether there are any underlying relationships between job characteristics and job outcomes independent of shared measurement tools. If this contrast shows only minor differences, the social information processing approach receives tentative support. If the job characteristics approach is correct, however, model IV should fit the data much better than any other model.

The five models were evaluated with a number of statistics. The maximum likelihood chi-square statistic indicates the overall fit of each model to the observed correlation matrix. This statistic, however, tends to provide inflated values when large samples and large numbers of observed variables are involved. The use of two supplementary statistics that are computed using the chi-square statistic avoids this problem. One is the normed incremental fit index, Δ_{kl} , suggested by Bentler and Bonett (1980). This normed index compares the increment in χ^2 for substantive models, using the fit of the null model as the basis for comparison.⁵ Δ_{kl} is conceptually similar to comparing the sizes of R^2 s in hierarchical regression analyses. The second index, suggested by James and colleagues (1982) is the parsimonious fit index, π . This index represents the average increase per degree of freedom in the normed fit index, Δ_{kl} , for a substantive model (models I through IV) relative to the null model (model 0). Whereas Δ_{kl} compares the incremental fit across any two models, π always compares a substantive model against the null model. Models II, III, and IV are hierarchically nested, but model I is only nested in model IV. Thus, model I cannot be directly compared with models II and III.

The ψ -matrices provide another point of information in examining the relative efficacy of the different models. They show the estimated correlations among latent variables for job characteristics and job outcomes. Particularly useful is a comparison of the correlations among latent variables for model I (no method effects specified) with the latent variable correlations for model IV (method effects allowed) because neither model constrains the correlations among job characteristics and job outcomes. To simplify this

⁵ Using the chi-square goodness-of-fit statistic to compare models k and l ,

$$\Delta_{kl} = \frac{(\chi^2_k - \chi^2_l)}{\chi^2_0} ,$$

where χ^2_k , χ^2_l , and χ^2_0 are the goodness-of-fit statistics for the most restrictive, least restrictive, and null models, respectively.

comparison of correlation matrices, regression equations are estimated from the correlations among latent variables in the ψ -matrices. In these regression analyses, each of the three latent variables for outcomes is regressed on the set of five latent variables for job characteristics for models I and IV. If these regressions among latent variables are roughly equal across the two models, we will infer negligible effects for method factors and interpret the results as supporting the job characteristics approach. Alternatively, if the relationships are substantially weaker in model IV than in model I, evidence supports the social information processing approach and method effects remain a serious concern in job characteristics research.

RESULTS

The conventional analytic strategy was conducted with separate reliability and regression analyses. Median reliabilities were .67, .90, and .78 for the eight summated scales supplied by respondents, observers, and pooled sources, respectively. Table 3 shows the results of the associated multiple regressions. Independent of the source of data, challenge satisfaction appears most predictable, and effort is the least predictable. Furthermore, the predictors explain a significant proportion of variance in outcomes in all cases, regardless of the methods used to obtain data. Surprisingly, the highest R^2 s for all outcomes occur when observers are the sole source of data, with R^2 s of .598, .709, and .140 for general satisfaction, challenge satisfaction, and effort. In comparison, R^2 s were .187, .425, and .134 when job incumbents supplied both job characteristics and outcome measures.

TABLE 3
Squared Multiple Correlations of Outcome Variables
Regressed on Job Characteristics by Data Source^a

Data Sources	Job Outcomes		
	General Satisfaction	Challenge Satisfaction	Effort
Outcomes supplied by respondents			
Predictors supplied by respondents	.187**	.425**	.134**
Predictors supplied by observers	.024*	.102**	.112**
Pooled	.097**	.257**	.121**
Outcomes supplied by observers			
Predictors supplied by respondents	.290**	.359**	.044**
Predictors supplied by observers	.598**	.709**	.140**
Pooled	.563**	.673**	.084**
Outcomes pooled			
Predictors supplied by respondents	.250**	.499**	.119**
Predictors supplied by observers	.140**	.237**	.145**
Pooled	.215**	.412**	.118**

^a Standardized regression coefficients available from the first author.

* $p < .05$

** $p < .01$

The structural equation analyses provided a similar, yet more direct, assessment of method effects. Table 4 shows the correlations among latent variables (ψ -matrix) as defined in models I and IV. Values of 1.000 or .000 are reported for fixed elements in these models and no latent variables are defined for method factors in model I. Of particular interest in this table are the correlations between the job characteristics and outcomes in model I versus model IV. These correlations are noticeably smaller in model IV, suggesting that relationships between job characteristics and outcomes are partially attributable to common method effects.

Table 5 compares the fits of the models to the observed correlation matrix with the normed incremental fit (Δ_{kl}) and parsimonious fit (π) indices. As mentioned in the previous section, these indices do not depend on sample size. Comparing models II, III, and IV against the null model, model 0, shows that all three models have marginally acceptable fits. The values of the normed incremental fit index, Δ_{kl} , indicate that: (1) method factors explain much of the observed correlation among variables (.13 for model I vs. model IV); (2) there are substantial correlations among job characteristics and among outcomes (.03 for model II vs. model III); (3) substantial correlations also exist among all theoretical constructs (.04 for model II vs. model IV); and (4) there is a significant, but weak, relationship between job characteristics and outcomes independent of method effects (.01 for model III vs. model IV). Direct comparison of chi-square values and the normed incremental fit index, Δ_{kl} , support the last finding, but the parsimonious fit index, π , does not.

Although model IV may be less parsimonious than model III, the existence of actual relationships between job characteristics and job outcomes is indicated by the correlation matrices for latent variables in Table 4. The introduction of method factors reduces, but does not eliminate, the correlations between the latent variables for job characteristics and latent variables for outcomes (model I vs. model IV). Table 6 shows the results of the multiple regression analyses for these relationships between job characteristics and job outcomes in the latent variable correlation matrices for models I and IV. Values of R^2 for general satisfaction, challenge satisfaction, and effort are .671, .774, and .188 for model I and .019, .152, and .202 for model IV. Only the model IV regression for general satisfaction fails to explain a significant amount of variance. Thus, for at least two of the three outcomes—challenge satisfaction and effort—this analysis suggests the existence of underlying relationships independent of method effects. The relatively weak regression results for model IV, particularly for general satisfaction, are also reflected in the marginal differences between models III and IV in Table 5.

DISCUSSION

Several conclusions are evident from the results of these parallel analyses using regression and structural equations. Consistent with previous research, clear relationships between job characteristics and outcomes emerge. Significant β -weights in the conventional regression analyses (Table 3) and the sizes of most of the correlations among latent variables in the analyses

TABLE 4
Fixed^a and Estimated Correlations among Latent Variables

(a) Model I										
Constructs	1	2	3	4	5	6	7	8	9	10
1. General satisfaction	1.000									
2. Challenge satisfaction	.994	1.000								
3. Effort	.176	.240	1.000							
4. Task identity	.387	.383	-.042	1.000						
5. Complexity	.777	.856	.178	.422	1.000					
6. Task feedback	.195	.180	.217	.518	.300	1.000				
7. Variety	.801	.845	.045	.448	.877	.197	1.000			
8. Autonomy	.779	.807	-.040	.500	.846	.188	.923	1.000		
(b) Model IV										
Constructs and Method Factors	1	2	3	4	5	6	7	8	9	10
1. General satisfaction	1.000									
2. Challenge satisfaction	.916	1.000								
3. Effort	.088	.079	1.000							
4. Task identity	.003	.114	-.115	1.000						
5. Complexity	.073	.329	.062	.204	1.000					
6. Task feedback	-.051	-.074	.200	.475	.233	1.000				
7. Variety	.106	.278	-.193	-.251	.611	.043	1.000			
8. Autonomy	.123	.267	-.306	.347	.554	.035	.774	1.000		
9. Interviews	.000	.000	.000	.000	.000	.000	.000	.000	1.000	
10. Card sorts	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000
11. Observation	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

^a Values of constrained elements are reported as 1.000 or .000 as specified by the model.

TABLE 5
Comparisons of Models for Goodness of Fit^a

Comparisons among Models	df	Difference in Chi-Squares	Normed Incremental Fit Index	Parsimonious Fit Index ^b
0 vs. I	76	15392.96	.74	.69
0 vs. II	97	17339.65	.83	.76
0 vs. III	110	18024.85	.86	.78
0 vs. IV	125	18183.12	.87	.77
I vs. IV	49	2790.16	.13	—
II vs. III	13	685.21	.03	—
II vs. IV	28	843.47	.04	—
III vs. IV	15	158.27	.01	—

^a χ^2 for model 0 = 20876.41, df = 1128; χ^2 s for all models are significant at $p < .001$.

^b Dashes indicate no value is computable (James et al., 1982).

TABLE 6
Results of Regression Analyses of Latent Variables for Job Outcomes on Latent Variables for Job Characteristics

Job Characteristics	Job Outcomes		
	General Satisfaction	Challenge Satisfaction	Effort
Model I			
Task identity	.006	.014	-.141**
Task feedback	-.004	-.061*	.203
Variety	.367**	.346**	.113
Autonomy	.191**	.051	-.605**
Complexity	.202**	.521**	.605**
R ²	.671	.774	.188
F _{5,503}	205.43**	344.51**	19.06**
Model IV			
Task identity	-.017	.133**	-.125*
Task feedback	-.052	-.212**	.210**
Variety	.018	.052	-.030
Autonomy	.107	.017	-.402**
Complexity	.019	.310**	.279**
R ²	.019	.152	.202
F _{5,503}	1.95	17.97**	20.56**

* $p < .05$

** $p < .01$

with structural equations of models I and IV (Table 4) demonstrate these relationships. More important, however, is the finding that job characteristics and outcomes are related to each other independent of method effects. Three findings refute the extreme form of the common-method criticism of the job characteristics approach—that observed relationships between job

characteristics and outcomes are solely attributable to method effects. These are the pattern of R^2 s across data sources in the conventional regressions (Table 3), the slight superiority of model IV over model III (Table 5), and the magnitude of R^2 s derived from the latent variable correlations of model IV (Table 6). Only the latent variable, general satisfaction, fails to be predicted significantly by any of the job characteristics, independent of method effects. Thus, it is safe to conclude that there is an underlying relationship between job characteristics and attitudinal outcomes. Changing actual job characteristics is likely to lead to some substantive improvements in challenge satisfaction and effort.

This conclusion, however, does not resolve the issue of the relative validity of the job characteristics and social information processing approaches, since both theories posit that relationships between job characteristics and outcomes are based on both method and substance. The theories differ in their emphases on the relative strengths of method versus substance. This study examined the issue of relative strength in analyses using both regression and structural equations. The conventional regression analyses across data sources show fairly consistent relationships between job characteristics and outcomes, with some noticeable, but not drastic, drops in R^2 s when different data sources are used to measure constructs. Thus, the conventional regressions do not reveal strong method effects, thereby lending support to predictions stemming from the job characteristics approach.

The structural equations analyses provided a more appropriate test of the competing predictions. Especially interesting are the comparisons of correlations among latent variables from models I and IV (Table 4), and the regression equations based on these correlations (Table 6). Table 6 indicates that, using model I latent variables, the job characteristics explain two-thirds of the variance in general satisfaction, but that the predicted variance drops to 2 percent when method effects are removed. A similar, although less drastic, drop is also evident for challenge satisfaction. The explanatory power for effort, however, is marginally increased by controlling for method effects. In other words, predictions based on the job characteristics approach are supported for effort, whereas common method effects are supported for the satisfaction variables.

The fact that method effects are stronger for certain outcomes than for others may appear confusing at first glance. This is particularly true if method effects are interpreted in terms of response effects, such as social desirability and leniency, that should span outcomes. We have advanced and employed additional interpretations of method effects that provide better explanations of the present results. The theoretical underpinnings of the two approaches in question provide a valid explanation for the differential importance of method versus substance in predicting different outcomes. Social information processing has its theoretical roots in social comparison theory and thus provides a better explanation of individuals' affective responses. On the other hand, the job characteristics approach, which has its roots in expectancy theory, serves better in predicting more behavior-oriented responses

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like motivation, effort, and performance. Griffin's (1983) results support this argument; they showed that manipulations based on the job characteristics approach predicted performance, but manipulations based on the social information processing approach did not. A major implication of the results reported here is that different theories are designed to predict, and in fact do predict, different kinds of outcomes. Using a single theoretical causal process to predict diverse criteria is bound to be problematic.

Differential predictability is also evident from the relative variance in the different outcomes that job characteristics explain. For instance, the results show consistently that job characteristics explain challenge satisfaction better than general satisfaction. General satisfaction is multiply determined (e.g., Locke, 1976), incorporating many facets such as comfort, supervision, pay, and the like (Barnowe, Mangione, & Quinn, 1973; Smith, Kendall, & Hulin, 1969), in addition to job quality or motivating potential. Challenge satisfaction, however, is more specifically related to job characteristics than is general satisfaction and, as a result, better explained by job characteristics.

In all, the main conclusions from the study are: (1) job characteristics and outcomes are related to each other; (2) this relationship partially reflects common method effects; (3) method effects vary with the theoretical issues under consideration; (4) different outcomes are predictable from different theoretical perspectives; and (5) it is inappropriate to treat specific job characteristics or specific outcomes as interchangeable. Several attributes of this study increase confidence in the generalizability of these conclusions. Respondents held widely varied jobs and worked in several organizations. We used differently worded questions to measure job characteristics and outcomes. A rigorous observer training program was undertaken prior to data collection, and observers had only limited exposure to the social realities defining incumbents' jobs. We modeled substantive and method effects simultaneously, using structural equations. Finally, the study satisfied most criteria specified as necessary by Mitchell (1985) for valid correlational research.

Despite these strengths, some shortcomings should be noted. This study did not employ self-administered questionnaires, the dominant organizational research tool for incumbent-supplied measures. Interviews and card sorts may induce different method effects than do questionnaires. Although it is not immediately obvious why self-report questionnaires should be susceptible to different kinds of method effects than interview and card sorts, future research should explore this possibility.

Another limitation appears in the minor discrepancies between results of the analyses using conventional regression and structural equations. These may be due to the inappropriate, yet inherent, assumptions of no measurement error in independent variables and no method effects in the regression analyses. The sensitivity of structural equations analyses to departures from normality in data may also be the source of these discrepancies.

Moreover, measures supplied by both incumbents and nonincumbents entail human inference. Just as incumbents' perceptions are subject to distor-

tion and bias, so also are other sources of information about job characteristics. For instance, observers may have rated satisfaction as being high when they observed good jobs. These implicit theories (Eden & Leviatan, 1975; Fichman, 1982; Staw, 1975), schemas (Markus, 1977), or scripts (Abelson, 1980) that observers can carry in their minds may enhance relationships between observed job characteristics and observed outcomes. If we are truly to disentangle actual and perceived job characteristics, we must use simultaneously multiple and diverse sources of information—other employees, workgroup members, supervisors, independent trained observers, company records, and task analysis.

Considerable organizational research proceeds on the assumption that objective information is ideal, and that self-reports are a poor approximation of objective reality. To the extent, however, that it is individual perceptions and attitudes that ultimately determine employees' responses to work environments, self-reports may be a valid and useful source of data. Our results indicate that self-reports and observations, although similar, are not identical in their relationships to outcomes. Instead of viewing objective data as best, therefore, it is more appropriate to consider different data sources as differing in their usefulness for answering specific questions (Gupta & Beehr, 1982).

To conclude, this study advanced theoretically based interpretations of common method effects in task design research. The results supported two predictions common to the job characteristics and the social information processing approaches: job characteristics and outcomes are related to each other, and these relationships are partially independent of method effects. As predicted by the job characteristics approach, the strength of the relationship between job characteristics and effort increases when method effects are removed. The drop in the strengths of the relationships between job characteristics and satisfaction after extracting method effects, however, supports the social information processing approach and criticisms of monomethod research on job characteristics (Roberts & Glick, 1981; Salancik & Pfeffer, 1978).

In addition to the findings unique to research on task design, this study also offers a methodology for assessing the relative importance of method effects in other areas of organizational research. Furthermore, it shows that the intensity of method effects varies according to the research issue under investigation. If strong, theoretically plausible reasons exist for suspecting that method effects may be confounding substantive relationships, a research design should include multiple methods to test for potential method effects.

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APPENDIX

Symbols in parentheses represent the source of data for an item, with I = interview, O = observation, C = card sorts; the number of response anchors; and the direction of coding for response anchors. Positive (+) coding means that larger values reflect more of the construct; negative (-) coding means that larger values reflect less of the construct.

Items measuring general satisfaction

1. All in all, how satisfied would you say you are with your job? (I, 4, +)
2. In general, how well would you say that your job measures up to the sort of job you wanted when you took it? (I, 5, -)
3. Knowing what you know now, if you had to decide all over again whether to take the job you now have, what would you decide? (I, 5, +)
4. If a good friend of yours told you (he/she) was interested in working in a job like yours, what would you tell (him/her)? (I, 5, +)
5. If you were free to go into any type of job you wanted, what would your choice be? (I, 5, -)
6. Check the box between the two "anchor points" at the end of each line that best describes (the employee's) job. Dissatisfying/satisfying. (O, 7, +)
7. (Answer the following question as you think (the respondent) would answer it). All in all, how satisfied would you say you are with your job? (O, 4, -)

Items measuring challenge satisfaction

8. The opportunities on my job to develop my special abilities. (C, 4, +)
9. How interesting my work is. (C, 4, +)
10. How much freedom I am given to decide how to do my work. (C, 4, +)
11. The extent to which my job gives me a chance to do the things I do best. (C, 4, +)
12. The difficulty of the problems I am asked to solve. (C, 4, +)
13. The extent to which I can see the results of my work. (C, 4, +)
14. Check the box between the two "anchor points" at the end of each line that best describes (the employee's) job. Boring/interesting. (O, 7, +)
15. Check the box between the two "anchor points" at the end of each line that best describes (the employee's) job. Challenging/not challenging. (O, 7, -)

Items measuring effort

16. How do you see yourself in your work? Working my hardest/not working hard? (I, 7, -)
17. Would you say you work harder, less hard, or about the same as other people doing your type of work? (I, 5, +)
18. How often do you do some extra work for your job which isn't required of you? (I, 4, +)
19. To what extent does the employee work hard on his/her job? (O, 7, +)
20. The individual working on this job expends a lot of effort trying to perform his/her job well. (O, 6, +)
21. My job gives me a chance to do a task from beginning to end. (C, 4, +)

Items measuring task identity

22. I am able to complete the work I start. (C, 4, +)
23. To what extent does the employees' most frequently performed work chunk(s) represent an "entire piece of work"? (O, 7, +)
24. The job provides an individual with the chance to finish completely any work he/she starts. (O, 6, +)
25. An individual working on the job usually can complete the entire job from beginning to end. (O, 6, +)
26. My job requires that I keep learning new things. (C, 4, +)
27. My job requires a high level of skill (C, 4, +)

Items measuring complexity

28. My job requires a lot of mental effort. (C, 4, +)
29. To what extent does the job require the use of sophisticated or complex skills? (O, 7, +)
30. How intellectually demanding is the job? (O, 7, +)
31. The job requires a person to have a lot of skill to do it adequately. (O, 6, +)
32. The job is so simple that virtually anybody could handle it with little or no initial training. (O, 6, -)

Items measuring task feedback

33. I have the opportunity to find out how well I am doing my job. (C, 4, +)
34. To what extent does doing the job itself provide the employee with feedback about how well he/she is doing? (O, 7, +)
35. Just doing the work required by the job provides many opportunities for a person to figure out how well he/she is doing. (O, 6, +)
36. The individual can see the results of his/her work. (O, 6, +)

Items measuring variety

37. My job lets me do a variety of different things. (C, 4, +)
38. My job requires that I do the same things over and over. (C, 4, -)
39. How much variety is there in the job? (O, 7, +)
40. The job requires the individual to do the same things over and over again. (O, 6, -)
41. The job provides an individual the opportunity to do a number of different things at work. (O, 6, +)

Items measuring autonomy

- 42. I have a lot to say over what happens on my job. (C, 4, +)
- 43. My job allows me to make a lot of decisions on my own. (C, 4, +)
- 44. I have enough freedom as to how I do my work. (C, 4, +)
- 45. How much autonomy is there in the job? (O, 7, +)
- 46. The job allows an individual to make a lot of decisions on his/her own. (O, 6, +)
- 47. The job denies the individual any chance to use his/her personal initiative or discretion at work. (O, 6, -)
- 48. He/she is given enough freedom to decide how to do his/her own work. (O, 6, +)

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FEEDBACK-SEEKING IN INDIVIDUAL ADAPTATION: A RESOURCE PERSPECTIVE

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This research examines a theory of feedback-seeking in organizations. Individuals are hypothesized to seek feedback on important issues and in new and uncertain situations. Results support these hypotheses. Individuals also report frequent seeking for feedback when they fear they are failing to attain goals. Long-tenured individuals seek less feedback, apparently in response to social pressures to appear confident and self-assured.

Several scholars have proposed that individuals actively interpret and organize their experiences (Jones, 1983; McHugh, 1969; Van Maanen, 1976) and map the environments they encounter (Bogart, 1980). White (1959) further proposed that, to achieve mastery, individuals continually explore within an environment until it is known and understood. All of these activities—exploring, interpreting, mapping, and organizing—fall within the general behavioral category of adaptation.

Despite the pervasiveness of these activities, relatively few studies have empirically examined them. With the exception of recent work by Feldman and Brett (1983) and some qualitative findings reported by Schein (1978), scholars have not tested theoretical propositions concerning adaptation within organizational settings.

To adapt is “to adjust fittingly” (*American College Dictionary*, 1966). In organizations, individuals adapt by tailoring their behaviors to fit the demands of a particular environment. The tailoring is based on information they are given or obtain about that environment. Thus, securing adequate information is a central consideration in successful adaptation (White, 1974).

This research took an initial step toward understanding the ways in which individuals adapt by focusing somewhat narrowly on one task of adaptation, securing adequate information. A kind of information that would seem to be especially important in the process of adaptation is that pertaining to the appropriateness or correctness of behavior for attaining various goals. This information is commonly called feedback (Ashford & Cummings, 1983; Ilgen, Fisher, & Taylor, 1979; Powers, 1973).

In the interpersonal realm, feedback involves information about how others perceive and evaluate an individual's behavior. Feedback can also be

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provided by tasks or generated by individuals on the basis of their own thoughts and feelings (Greller & Herold, 1975). A given piece of feedback can fulfill different functions. It can serve as a reward and thus motivate performance, and it can serve as a cue useful in regulating behavior appropriately (Payne & Hauty, 1955). This research focused on the second function of feedback. By obtaining feedback, individuals can learn about the evaluative contingencies within their environments and how they stand with respect to those contingencies (Naylor, Pitchard, & Ilgen, 1980). To the extent that the ability to attain things of value within an environment can define successful adaptation (White, 1974), feedback should be a key information resource and feedback-seeking an important aspect of the adaptive process.

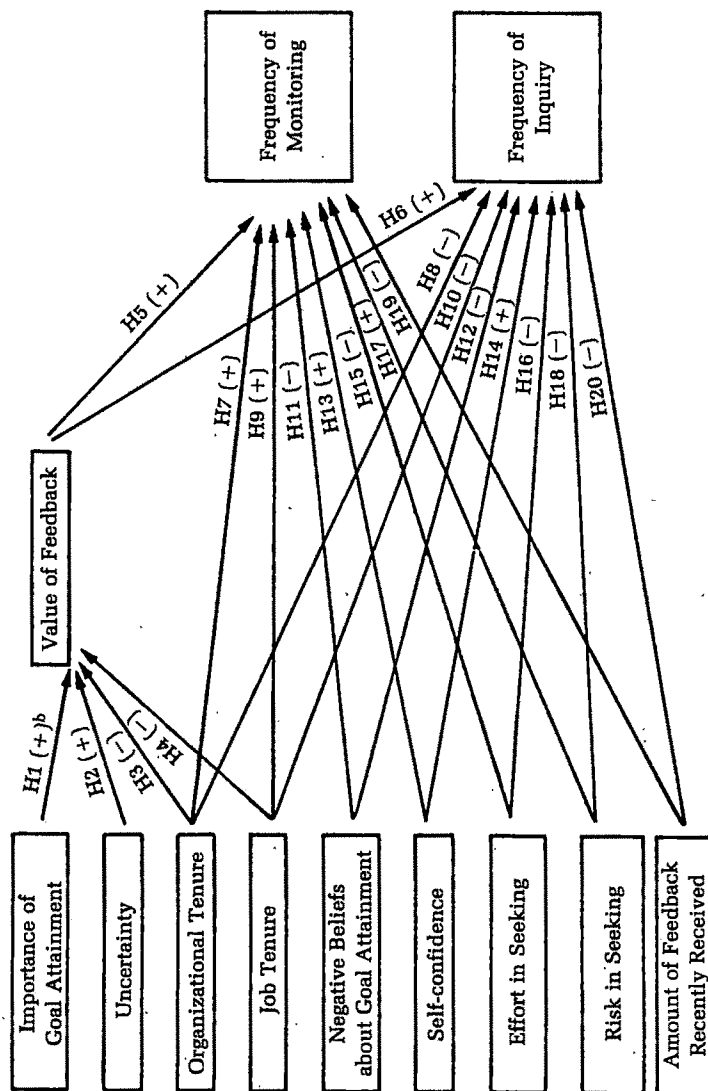
Ashford and Cummings (1983) defined feedback-seeking as conscious devotion of effort toward determining the correctness and adequacy of behaviors for attaining valued end states. They suggested that individuals use one of two distinct strategies to obtain information from their environments. First, individuals may monitor an environment for feedback by observing various situational cues, observing other individuals, and observing how others respond to their behavior in order to infer how well they are doing. In the parlance of social learning theory, monitoring involves receiving feedback vicariously through watching how others are responded to and reinforced (Bandura, 1977). Alternatively, individuals may directly inquire as to how others perceive and evaluate their behavior.

Ashford and Cummings (1983) argued that individuals will differentially use these strategies depending on the perceived costs involved with each. For example, if they think directly asking for feedback is inconsistent with maintaining an assured self-presentation (Baumeister, 1982), then the cost of using a strategy of inquiry increases. Under these conditions, individuals should inquire less and monitor more frequently in order to obtain the feedback they need. Monitoring in this case is the less costly strategy.

Studying processes of feedback-seeking should add to our understanding of both how individuals behave in organizations and, ultimately, how managers can handle various situations. As Katz (1980), among others, noted, individuals face a formidable task as they try to understand their organizations. Discovering "when to ask questions, give advice, take a vacation, quit early or push for a pay raise" (Katz, 1980: 93), as well as uncovering the various reward contingencies operating in an environment, are all necessary tasks for those hoping to survive and succeed in an organization. However, knowing the dimensions along which success is gauged in an environment is not sufficient. Individuals must also develop an ability to read feedback, to see themselves as others see them, and to understand how others evaluate their behavior. With this additional information, they can make corrections in behaviors and increase the likelihood of attaining their goals. Thus, understanding when individuals undertake feedback-seeking and where they may go wrong in the process is an important area for investigation.

Figure 1 presents the hypotheses tested in this research. The discussion presented in subsequent paragraphs gives the rationale for each of them.

FIGURE 1
Heuristic Model Giving Summary of Hypotheses



^a Figure 1 presents the conceptual model that guided the hypotheses for this research. This model could not be tested causally in this study because the data collected were cross-sectional. Thus, multiple regression rather than a path analysis was used to test the hypotheses.

^b H₁ - H₂₀ refer to the 20 hypotheses tested. The + or - sign in parentheses indicates the direction of the hypothesized relationship.

ANTECEDENTS OF FEEDBACK SEEKING

The proposed hypotheses are based on the general proposition that it is possible to predict when individuals will actively seek feedback by weighing those conditions that make feedback beneficial to them against factors that make seeking it out costly. In this sense, feedback can be treated like any other resource. The variables examined in this research, then, either directly influence the value of feedback as a resource, or index a cost inherent in searching for feedback.

Factors Influencing the Value of Feedback

The value placed on any resource—whether it be time, money, or steel—is not inherent in the resource itself but derives in part from the value placed on what it will produce. Individuals desiring material goods will thus value money; individuals interested in producing cars will value steel. Thus, if feedback is an information resource making possible the realization of various goals, the perceived importance of attaining a given goal will affect its perceived value. At its limit, the logic underlying Hypothesis 1 implies that an individual placing no importance on a particular goal should also have no desire for feedback useful in correcting errors with respect to that goal.

The degree of uncertainty about the behaviors appropriate or most useful for attaining a goal and how those behaviors might be evaluated by others also determines the value of feedback. Laboratory studies testing Berlyne's (1960) theory of uncertainty and choice have documented the empirical relationship between feelings of uncertainty and information search (Crawford, 1974; Conolley, Gerard, & Kline, 1978; Lanzetta, 1970; Trope, 1975). Berlyne (1960) proposed that uncertainty and information-seeking are linked because the experience of uncertainty renders information more valuable and thus individuals are motivated to seek it. This research explicitly examined these theoretical links. Uncertainty is defined as a state in which individuals have no, little, or inconsistent information about the stimuli of interest (Gifford, Bobbitt, & Slocum, 1979; Heslin, Blake, & Rotton, 1972). Increased feelings of uncertainty concerning goal-related issues should increase the perceived value of feedback (Hypothesis 2), since such information allows people to structure situations and make choices as to how to proceed (Atkin, 1973; Berlyne, 1960).

Job and organizational tenure should also affect the value of feedback. Tenure and experience within a company are generally assumed to provide employees with an increasing number of cues concerning both the behaviors likely to be evaluated most positively in that setting and the relative value of various strategies of goal attainment (Hall, 1976; Katz, 1980). For example, it is the new employee who must determine "what is really expected of one, what is really rewarded, how much one can trust the official formal statements" (Schein, 1978:100). Hypothesis 3 proposes, however, that with increasing tenure these expectations become understood and individuals can judge pretty well for themselves how well they are doing (Katz, 1980).

Once individuals gain that ability they should value feedback less and thus seek it less frequently.

The socialization literature suggests, however, that any time individuals cross functional, hierarchical, or group boundaries a process of resocialization must occur (Katz, 1980; Van Maanen & Schein, 1979). Individuals entering even the most routine and simple jobs are likely to find their job requirements and contexts ambiguous. Cultures may also differ considerably among various workgroups within an organization (Siehl & Martin, 1982). A new job presents a new subenvironment to be learned and understood as behavioral expectations, evaluative criteria, and standards for performance may differ vastly from those of the previous position. In recognition of these learning demands, Hypothesis 4 proposes that the longer the job tenure, the lower the value of feedback.

Feedback should thus be perceived as valuable to individuals entering a new environment, whether it is a company as a whole or a subenvironment delineated by a new job, boss, or workgroup. It is at such points of entry and transition that the learning tasks environments impose are the greatest. Feedback helps individuals both to understand new environments and to map their evaluative contingencies, thereby enabling successful adaptation.

Factors Influencing the Frequency of Feedback-Seeking

The dependent variable of ultimate interest in this research was the frequency with which individuals will try to adapt to their organizational settings by actively seeking feedback through strategies of either monitoring or inquiry. The frequency of seeking is a function of several direct influences. First, the basic premise underlying the set of proposed hypotheses is that the perceived value of feedback should directly determine the extent of active feedback-seeking. Thus, Hypotheses 5 and 6 state that individuals who value feedback should seek it more often through both monitoring and inquiry.

As was mentioned in the introductory section, however, the value of feedback does not solely determine how frequently it will be sought. Rather, individuals should take several costs into account in their seeking behavior. The frequency of feedback-seeking, for example, may be inversely related to an individual's length of tenure in an organization and in a given job. A decrease in search for feedback by more tenured individuals is due only in part to a decrease in its value. Such tenured employees may also respond to social expectations that, as old-timers, they should know the ropes and not depend on guidance from others (Katz, 1980). They respond to those expectations by infrequently seeking feedback in public ways in order to maintain a confident, assured self-presentation (Baumeister, 1982). In this sense, the ability to ask questions and ask for feedback may be a special privilege offered to those new to an organization or job (Schein, 1978). Given this argument, Hypotheses 8 and 10 propose that inquiry will become less frequent as tenure increases. Note that Hypotheses 7 and 9 state that by implication the use of monitoring should increase with tenure as individuals rely on

this relatively private seeking strategy in order to maintain an appropriate self-presentation.

Feedback-seeking is also a costly activity in that it potentially increases the chances of hearing something that one would rather not know. Although individuals are indeed instrumental beings and thus value feedback because it allows them to correct errors and attain goals (Locke, 1978), they also want to sustain favorable views of themselves in order to maintain their self-esteem (Brickman & Bulman, 1977; Jones & Gerard, 1967). As Jones and Gerard pointed out, an individual has a dual orientation in any setting: "He wants to see himself honestly, as others see him, but he also wants to see himself in the best possible light" (1967: 323). One way individuals defend their self-esteem is by avoiding disquieting information and feedback (Janis & Mann, 1977; Miller, 1976). Because feedback is evaluative information about the self, a primary deterrent of feedback-seeking may thus be the fear of hearing something negative.

This research examined two variables that index the extent to which individuals believe that available feedback is likely to be negative. The first measured respondents' beliefs about their own levels of performance. Hypotheses 11 and 12 argue that individuals who believe they are doing poorly in their efforts to attain goals ought particularly to avoid seeking feedback in an attempt to protect themselves from possible negative feedback (Willerman, Lewitt, & Tellegen, 1960; Zuckerman, Brown, Fox, Lathin, & Minasian, 1979). These hypotheses imply that, for these performers, motivation to defend their egos may override desire to obtain information that would facilitate successful adaptation. The second variable measures respondents' levels of self-confidence. Although self-confident individuals might view feedback—either positive or negative—as useful in learning about themselves and their abilities, those lacking confidence will likely see negative feedback as particularly threatening to their self-esteem (Singer, 1966). Thus, the logic underlying Hypotheses 13 and 14 is that individuals low in self-confidence are more likely to fear receiving negative evaluations and to regard their social environments as threatening. As such, they will seek feedback less frequently as they try to protect themselves from disquieting messages (Friend & Gilbert, 1973).

Individuals should also respond to direct costs in their feedback-seeking behavior. Costs of seeking have long been thought to affect the acquisition of information (Lanzetta, 1971). O'Reilly (1982), for example, found that decision makers will use accessible sources rather than other sources providing higher quality information because of the cost in effort involved in seeking out those more informative sources. O'Reilly cited similar findings in research by Clausen (1973), Gertsberger and Allen (1968), Menzel and Katz (1955), and Mintzberg (1973).

Both strategies of feedback-seeking potentially involve costs in effort. In monitoring, individuals must actively observe situations, perhaps for some time, and devote cognitive effort toward deriving interpretations. Inquiry may involve their tracking down potential sources of feedback (targets),

finding appropriate times, and explaining their behavior. If individuals feel that obtaining useful feedback requires a great deal of effort, they may seek it less frequently. As proposed in Hypotheses 15 and 16, the effort involved deters active search.

A second potential cost in feedback-seeking is the risk of embarrassment and loss of face inherent in the inquiry strategy. Directly asking others for feedback differs from monitoring in the visibility of the behavior. Inquiry is an interpersonal event that is subject to the inference processes of others (Ashford & Cummings, 1983). By asking for feedback, individuals risk the possibility that others will see that act as a sign of weakness and uncertainty. As proposed in Hypothesis 17, the perception that such risks exist should deter the use of an inquiry strategy.¹ In such cases then, the use of monitoring should increase because it involves comparatively fewer costs. This relationship is stated as Hypothesis 18.

Risk costs differ from the self-esteem costs incurred by hearing something negative that were discussed earlier in this section. Risk costs refer to how an act of seeking itself may be evaluated. For example, even if a person receives positive feedback from a target about certain behavior, the target may negatively evaluate the seeker's need to know as a sign of insecurity. Alternatively, a seeker might receive devastating feedback and yet the target may positively evaluate the act of seeking as signaling the seeker's desire to improve. The two costs are proposed to be independent.

Finally, Naylor and colleagues (1980) proposed that individuals have finite supplies of energy that they allocate to various activities in their workplaces. Actively seeking feedback requires energy. If the metaphor of feedback as a resource is valid, it would seem that the amount of energy individuals will devote toward seeking feedback will depend on the store they have on hand. Individuals who have already received much feedback, for example, will devote effort to other activities. They should not value feedback less than they did before but will simply not be motivated to seek more of it actively since they have some on hand to use. In contrast, individuals who have not received much feedback should be especially willing to devote effort toward actively seeking it within work environments. This argument supports the hypothesized negative relationship (Hypotheses 19 and 20) between the amount of feedback received and subsequent feedback-seeking.

These 20 hypotheses are thought to capture the major determinants of the types (monitoring or inquiry) and levels of feedback-seeking that individuals may undertake in their efforts for adaptation. The hypotheses derive from considering feedback as a valuable individual resource (Ashford & Cummings, 1983) and also take seriously the costs of seeking it within organizations.

¹ See Broll, Gross, and Piliavin (1974) and Tessler and Schwartz (1972) for similar arguments concerning seeking help on a task.

METHODOLOGY

Participants, Setting, and Procedures

Employees in the marketing department of a large midwestern public utility located in an urban area ($N = 331$) participated in the study by completing questionnaires. Participation in the study was voluntary. The researcher administered the questionnaire to 300 employees during half-hour meetings in their workplace during work hours. Questionnaires were collected at that time and confidentiality was assured. The remaining 31 employees, representing downstate offices, filled out questionnaires sent by mail and returned them directly to the researcher.

Respondents had the following characteristics: 45 percent were male; their average age was 33.3 years ($s.d. = 10.7$ years); they had been with the company for an average of 10.4 years. They represented the following job types: account executives (20%), service advisors (8%), customer services representatives (10%), and communication consultants (22%). The remaining respondents included staff managers, clerical workers, clerical supervisors, and market administrators. Approximately 20 percent held supervisory jobs; the remainder were involved in the direct sale of the utility's products (account executives) or in technical support of the sales effort (customer service representatives, communication consultants, and service advisors). Of the various job types, only the communication consultants were represented by a union. With this number of respondents, statistical power to detect effects at the .05 level is .90 (Cohen & Cohen, 1975: 119).

With respect to the generalizability of results, the number of respondents was adequate for the analyses performed and reflected a good mix of job types, education levels, and lengths of tenure in the organization. The respondents also reflected the perceptions of both men and women approximately equally. But the fact that the respondents were drawn solely from one department of a regulated utility limits generalizability. Additionally, the mean age of respondents was fairly low and most reported relatively short job tenures ($\bar{x} = 2.2$ years). These attributes of the respondents need to be considered as potential limits to the generalizability of these results.

Access to this organization was gained through a direct request to the Vice President of Marketing, who gave permission for the study to proceed as an unfunded outside research project completely in the control of the author.

Measures

Implicit in the discussion of the hypotheses is the notion that the processes involved in seeking feedback are goal-specific. That is, individuals seek feedback about behaviors specifically aimed to achieve goals, and issues specific to each goal influence their seeking. Given this perspective, the intent of this research was to test the hypotheses with regard to two specific goals: (1) performing well on the job, and (2) having potential for advancement within the organization. Focusing on two goals allowed an exploratory

examination of feedback-seeking differences due to the characteristics of the goal in question. Several of the constructs were thus measured with specific goal referents: importance of a goal, the value of feedback for achieving a goal, the amount of feedback received about a goal, negative beliefs about one's status of goal attainment, uncertainty about appropriate goal behaviors, and frequencies of the two types of seeking—monitoring and inquiry. Separate scales were constructed to measure each of these constructs for each goal.

In assessing the measures to be used in testing hypotheses, however, measures for the two separate goals for the same construct were found to be highly correlated (average correlation = .54). Thus, an independent assessment of the hypotheses for each goal was not possible. In addition, a principal components factor analysis revealed that items for the three dependent variables, the value of feedback and the frequency of monitoring and inquiry, were not distinguished by goal. In fact, a single underlying dimension that included items from both goals could represent each of these constructs. Given these findings, it is clear that these measures cannot detect differences in feedback-seeking for these two goals. Consequently, it was decided to test the hypotheses solely for one goal. The goal of performance was chosen on the basis of its long research history in the field of organizational behavior.

Table 1 presents characteristics of the scales used in this research. The actual items appear in the Appendix. A principal components factor analysis was performed on each scale to assess its dimensionality. With the exception of two scales, each scale was found to be unidimensional. The following subsections address the dimensionality of the two exceptions along with other pertinent measurement issues.

Reliability issues. Two variables, the importance of performance and negative beliefs about potential for goal attainment, showed constrained and highly skewed distributions. In this sample, most respondents rated high performance as an important goal and held fairly positive beliefs about their potential to achieve this goal. These skewed distributions contributed to the marginal reliabilities of these scales.

Dimensionality issues. Results of the factor analysis indicated that two variables, risk in seeking and amount of feedback received, were not unidimensional. The items measuring perceived risk in feedback-seeking represented two underlying factors. Factor 1 contained items referring to risk associated with seeking feedback from co-workers, and items loading on Factor 2 referred to risks in feedback-seeking from supervisors. The two factors were significantly correlated ($r = .41, p < .001$). This research articulated no source-specific hypotheses. Rather, the issue of interest was the effect of a general perception that risks exist on the reported frequency of feedback-seeking. Thus, the items across both factors were summed to create the risk scale.

Items measuring the amount of feedback received also loaded on two separate factors, each reflecting different sources of feedback. The first factor consisted of items referencing private sources (self and task); items on the

TABLE 1
Characteristics of Measures

Scales	Numbers of Items	Means	Standard Deviations	Reliabilities ^a
Importance of performance goal	3	13.77	1.24	.51
Uncertainty	4	11.82	3.43	.82
Organizational tenure (months)	1	125.17	101.04	—
Job tenure (months)	1	33.18	32.68	—
Negative beliefs about goal attainment	3	5.20	1.71	.57
Self-confidence	4	17.60	2.50	.60
Effort in seeking	4	9.50	2.79	.71
Risk in seeking	10	20.79	5.54	.80
Amount of feedback received	5	14.23	2.62	.58
Value of feedback	3	12.32	1.87	.72
Frequency of monitoring	4	13.65	3.29	.77
Frequency of inquiry	2	5.20	1.80	.33 ^b

^a Reliabilities were assessed with Cronbach's alpha, unless otherwise stated.

^b Interitem correlation.

second factor referred to public sources of feedback such as supervisors, co-workers, and friends. These factors were significantly correlated ($r = .31$, $p < .001$) and were summed to form a composite index of the total amount of feedback received that reflected the intended theoretical construct.

RESULTS

Three separate multiple regression analyses were performed to examine the relationships of interest. Three dependent variables were examined: the value of feedback, the frequency of monitoring, and the frequency of inquiry. Table 2 presents the correlations among the independent and dependent variables. Tables 3 and 4 present the results of the multiple regression analyses. Although some of the correlations among the independent variables presented in Table 2 are significant, their magnitudes are not strong enough to demonstrate a serious threat of multicollinearity (Cohen & Cohen, 1975).

The regression coefficients linking the perceived importance of performance as a goal, perceived uncertainty about performance-related issues, and job tenure to the perceived value of feedback were all significant and in the hypothesized direction. These findings support Hypotheses 1, 2, and 3. Length of tenure in the organization, however, had no direct relationship to the perceived value of feedback, disconfirming Hypothesis 4. The most important predictor of the value of feedback about performance behaviors was the length of job tenure. Respondents with long tenure on the job perceived less value of feedback on performance than other respondents. These variables explain 10 percent of the variance in the perceived value of feedback about performance.

TABLE 2
Bivariate Correlations^a among Independent
and Dependent Variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Importance of goal											
2. Uncertainty	-21***										
3. Organizational tenure	01	09									
4. Job tenure	00	04	41***								
5. Negative beliefs about goal attainment	-15**	08	-07	-10*							
6. Self-confidence	15**	-10*	03	04	-35***						
7. Effort in seeking	-16**	54***	12*	-06	15**	-20***					
8. Risk in seeking	-18***	22***	14**	04	17***	-30***	40***				
9. Amount of feedback received	18***	-34***	-17***	-09	-07	17***	-26***	-21***			
10. Value of feedback	20***	08	-02	-20***	-02	09	14**	-09	08		
11. Frequency of monitoring	11*	-15**	-26***	-20***	13*	06	-08	-05	30***	27***	
12. Frequency of inquiry	04	-15**	-32***	-17**	12*	04	-13*	-18***	30***	20***	51***

^a Decimal points omitted.

* $p < .05$

** $p < .01$

*** $p < .001$

TABLE 3
Multiple Regression Analysis
of Value of Feedback about Performance Behaviors

Independent Variables	<i>b</i>	Beta	<i>t</i>
Importance of performance goal	.32	.23	3.98***
Uncertainty	.06	.12	2.07*
Organizational tenure	.00	.02	0.39
Job tenure	-.01	-.24	-3.51***
Adjusted R ²	.10		

* $p < .05$ ** $p < .01$ *** $p < .001$

TABLE 4
Multiple Regression Analysis
of Feedback-Seeking Variables

Independent Variables	Frequency of Monitoring			Frequency of Inquiry		
	<i>b</i>	Beta	<i>t</i>	<i>b</i>	Beta	<i>t</i>
Organizational tenure	-.07	-.23	-3.76***	-.00	-.20	-3.25***
Job tenure	-.00	.07	-1.19	-.00	.03	-0.47
Negative beliefs about goal attainment	.28	.15	2.63**	.16	.16	2.63**
Self-confidence	.17	.12	2.08*	.04	.06	0.99
Effort in seeking	-.06	-.05	-0.84	-.03	.05	0.76
Risk in seeking	.03	.06	0.90	-.02	-.06	-0.97
Amount of feedback received	.34	.27	4.68***	.14	.21	3.53**
Value of feedback	.42	.22	3.70***	.19	.18	2.95**
Adjusted R ²	.26			.20		

* $p < .05$ ** $p < .01$ *** $p < .001$

As for the two variables measuring feedback-seeking, the value of feedback was significantly and positively related to the frequency of both monitoring and inquiry. These results support Hypotheses 5 and 6. Individuals who valued feedback on their performance reported that they frequently monitored and asked for feedback related to their performance.

In contradiction of Hypotheses 7 and 8, job tenure was not related to the frequency of either monitoring or inquiry. However, the negative coefficients relating organizational tenure to the perceived frequency of inquiry for feedback on performance support Hypothesis 10.² But Hypothesis 9, stating that

² Given the correlation between job and organizational tenure, multicollinearity might be thought to bias or attenuate the tenure coefficients. When the regression model is analyzed with only job tenure and then again with only organizational tenure, however, the coefficients do not significantly differ from those presented in Tables 4 and 5, suggesting that multicollinearity is not a problem for these two variables.

individuals would compensate for the increased costs of inquiry by monitoring for feedback more frequently, was not supported. More tenured individuals both monitored and inquired less for feedback.

Results supported neither Hypotheses 11 nor 12. Individuals with negative beliefs about their performance did not avoid feedback, but rather reported more frequent seeking by both monitoring the environment for feedback and directly inquiring for feedback assessments.

Results did support Hypothesis 13. Individuals high in self-confidence reported monitoring for feedback more frequently. Hypothesis 14 was not supported, however, as respondents' self-confidence was not related to the perceived frequency of inquiry for feedback on performance.

The perceived effort and risk costs involved in seeking feedback had no relationship to either seeking strategy, disconfirming Hypotheses 15 through 18. In this data set, the costs of seeking did not deter searching for feedback.

The positive coefficients linking the amount of feedback received with the perceived frequency of monitoring and inquiry for both goals contradicted Hypotheses 19 and 20. These results not only fail to support the hypothesized relationships, but are problematic for the logic of the resource metaphor.

The set of predictors explained 26 percent of the variance in monitoring for feedback and 20 percent of the variance in inquiry. The perceived value of feedback was the most important determinant of reported frequency for both monitoring and inquiry, and organizational tenure emerged as the primary deterrent.

DISCUSSION

Evidence Supporting Feedback as a Personal Resource

The word resource identifies an entity with some utility or value, a helpful means for achieving an end. Consistent with this notion, the data indicate that high perceived value of feedback is associated with reports of relatively frequent feedback-seeking. The resource analogy also implies that if feedback is to be considered a resource, its value will derive in part from the desirability of the end it helps produce. Accordingly, respondents who highly valued the end state—the goal to be achieved—tended to also value the resource of feedback.

The small R^2 may be due to the constrained variance in ratings of the importance of performance, as most respondents rated this goal very highly. The true influence of the importance of performance on the value of feedback on performance was probably underestimated in this data set because of the low variance in importance ratings and the resultant poor reliability for this scale.

Feedback's value as a resource, however, stems also from its utility in resolving various uncertainties surrounding the attainment of goals. Consistent with the literature on uncertainty (Berlyne, 1960; Crawford, 1974; Gifford et al., 1979), both feelings of uncertainty concerning the behaviors required

to achieve performance goals and potential evaluations of those behaviors were related to the respondents' beliefs about the value of feedback. As operationally defined, uncertainty stemmed from a perceived lack of information or inconsistent information about these issues.

The value of feedback, however, appears to be viewed differently at different states of an individual's tenure within an organization. Feedback seems to be a resource useful in adapting to a new environment defined by a particular job. As individuals gain tenure in a job, they perceive feedback as less valuable. However, as individuals gain tenure in an organization, they do not necessarily value feedback on performance less. The data suggest that individuals see feedback as valuable in mastering subenvironments defined by particular jobs, regardless of whether those jobs are their first or are later in their organizational tenures. As subenvironments become known and predictable, however, individuals value feedback less. The perceived value of feedback thus can be presumed to fluctuate as individuals move from job to job within an organization rather than to decrease monotonically as a function of organizational tenure.

A second possibility is that individuals desire different types of feedback in the different situations they encounter as they gain tenure in a firm. For example, Feldman and Brett (1983) suggested that those new to an organization may require social feedback and support, but those with some tenure who face a new job environment following a transfer will need feedback on tasks. Thus the particular context faced by an individual may affect the type of feedback sought.

The data for this sample indicate, however, that although individuals with long organizational tenure do not value feedback less, they do report seeking it less frequently. Organizational tenure was significantly and negatively related to the perceived frequency of both monitoring and inquiry. These results are consistent with the argument made earlier that a desire to avoid disclosing uncertainty may deter individuals with long tenure in an organization from seeking feedback. That is, as organizational tenure increases, people may feel that seeking feedback about their performance would undermine their standing as confident and self-assured veterans in the eyes of others, and thus they seek it less frequently.

This explanation for the observed relationship receives some additional support in this data from a small but significant ($r = .14, p < .01$) positive correlation between organizational tenure and the perception that seeking feedback involves risks. This result, along with the lack of relationship between organizational tenure and the value of feedback, suggests that more tenured individuals seek feedback less not because feedback is less of a resource but because the social costs of seeking it become too high. Although this result suggests processes that may accompany tenure, it must be kept in mind that the data tapped individuals at only one point in time. Thus it is possible that we are detecting relationships unique to this particular group of employees.

Ego-Defense Motivation

In addition to the deterrents related to self-presentation that may accompany organizational tenure, a further deterrent to feedback-seeking may exist. For certain individuals, a desire to see themselves favorably may deter feedback-seeking, whatever the length of their tenure. These individuals are thought to curtail seeking to avoid messages they believe might be negative.

Consistent with this argument, individuals low in self-confidence reported less frequent monitoring of feedback. Individual differences in self-confidence were not, however, related to the frequency of inquiry. The result for monitoring complements previous findings of research on self-esteem. Weiss and Knight (1980) found that individuals with high self-esteem relied more on themselves and less on their job environments to guide task-related behaviors. They argued that these individuals are confident of their abilities to do well and feel little need to explore their job environments for cues about how to perform. The two findings taken together suggest that individuals with high self-esteem may not rely on their environments to determine *what to do* (how to perform) but may confidently and proactively use their environments to assess *how well* they are doing. In contrast, individuals with low self-esteem, lacking confidence in their abilities, may rely on the environment to tell them *what to do*—which tasks to perform and in what sequence—but may shy away from an assessment of *how well* they have done it. They may do so by seeking feedback infrequently.

It was further proposed that individuals who believe they are not doing well in attaining goals would similarly avoid feedback-seeking to protect themselves from painful information. The data directly disconfirm this hypothesis and provide a surprising source of support for the portrayal of feedback as a resource. Individuals' negative beliefs about attaining the goal of adequate performance were in fact positively related to the perceived frequency of monitoring and inquiry. This finding clearly contradicts the ego-defense argument and suggests that perhaps these individuals see feedback as useful. Seeking feedback from others may seem to be a natural, instrumental course of action as individuals monitor their own assessments of performance and try to improve their chances of attaining goals. The finding is very supportive of the proposition that individuals view feedback as a resource, for if it is a resource, those who can most benefit from it ought in particular to seek it.

Evidence Not Supporting Feedback as a Personal Resource

Results did not support some of the hypotheses. This section identifies these sources of disconfirmation and presents possible explanations for these findings.

Possession of a stock of a resource was argued to reduce the amount of energy devoted to attaining additional supplies of that resource. Contrary to this logic, however, for this sample the amount of feedback an individual

had recently received was associated with a reported increase in both monitoring and inquiry.

One explanation for these results is that those who seek feedback experience its value, enjoy improved performance, and thus are motivated to seek again. Although this reinforcement argument might explain these results, a more likely explanation lies in the limitations of the methodology used to assess the proposed relationships. The findings may reflect the fact that individuals who monitor and inquire more frequently quite naturally obtain more feedback. In other words, though the amount of feedback recently received was hypothesized to be an independent variable leading to the feedback-seeking criteria, it may well be an outcome of seeking. Given the cross-sectional nature of this research, this possibility cannot be ruled out.

A second threat to the utility of the resource metaphor arises when considering the results relating the costs of seeking to its frequency. A resource perspective would clearly argue that the greater the costs associated with obtaining a given resource, the less that resource will be sought. Research on predecisional information search has supported this proposition (Lanzetta, 1970, 1971). In this data set, however, neither perceived effort nor risk costs influenced reported feedback-seeking.

One explanation for these findings may lie in the interpretation of the economics of resource use. A strict economic resource perspective would argue that individuals weigh the costs of obtaining additional quantities of a resource against the value of that resource in determining search behavior (Atkin, 1973). If a resource is very valuable, they may be willing to incur great costs in seeking it out. In contrast, high costs would strictly deter active seeking if an individual places a low value on the resource.

A moderated regression was undertaken to assess these post hoc propositions. Two interaction terms were added to the model in the equations for the frequency of monitoring and of inquiry. The interaction terms were created by multiplying scores of the variable measuring value of feedback first with effort and then with risk. These interaction terms were not significant for either monitoring or inquiry, suggesting that the value placed on the resource did not result in differential effects for the costs of search on subsequent seeking behavior.

Perhaps Crawford's (1974) conclusion about individual search behavior is relevant for this sample as well. He argued:

Individuals do not seem to employ an averaging rule for rewards and costs. Cost factors may play a significant role in the instigation of search behaviors while reward maintains the search response once emitted (1974: 627).

Crawford's argument suggests that effort and risk did not affect the frequency of feedback-seeking because, although these variables may influence the initiation of search behavior, they exert a nonsignificant influence on the frequency of those behaviors over time. Since this research measured chronic levels of seeking, the effect of these cost variables may have been obscured.

The data also refuted the conceptual independence of the two seeking strategies, monitoring and inquiry. In contrast to the argument that previous

research posed (Ashford & Cummings, 1983), these strategies appear to be neither compensatory nor independent. In fact, the two strategies enjoy quite similar relationships with the predictors and are highly correlated. At this point, given the level of knowledge about these processes, our effort may be better directed toward predicting a general level of activity within the feedback process rather than the specific forms that activity might take. It should be noted, however, that consistency biases of self-reports and common method variance may also account for the high correlation between the reported use of these strategies.

Limitations

This research has some clear limitations. First, the reliance on cross-sectional data does not allow the making of causal statements about the process of feedback-seeking. Although these data are relatively informative given the current level of theoretical development and empirical findings concerning individual adaptation within organizations, the need for longitudinal models and controlled experimental studies that would further our understanding of these processes is clear. Second, the data are self-reports of feedback-seeking efforts. Though methodologies based on self-reports dominate studies that deal with adaptation (Feldman & Brett, 1983; Latack, 1984), they have two inherent weaknesses, one of which is particularly relevant to this study. The first and most common weakness is that self-reports may not validly reflect actual behaviors. The second lies in asking individuals to report the frequency with which they initiate various behaviors such as seeking information on tasks (Feldman & Brett, 1983; Weiss, Ilgen, & Sharbaugh, 1982), feedback (Ashford & Cummings, 1983), and social support (Feldman & Brett, 1983; House, 1981). Individuals may overreport actions undertaken at their own initiative. They may claim, for example, encounters involving feedback that were initiated by a supervisor as feedback they actively sought. Though items in this study were clearly worded to identify initiators, the possibility of overreporting must be considered.³

³ This limitation would be a particular concern if the bias were not randomly distributed across all respondents. To test whether employees holding different jobs (i.e., sales, technical, and clerical employees) and of differing managerial ranks (i.e., supervisory vs. nonsupervisory personnel) differed in their self-reports of feedback-seeking, two one-way ANOVAs were undertaken for each dependent variable. The ANOVA for rank revealed that supervisory personnel did not differ from nonsupervisors in their reports of monitoring ($F_{1,287} = 1.66, p = \text{n.s.}$), or inquiry ($F_{1,285} = 1.70, p = \text{n.s.}$). The ANOVA for type of job uncovered no difference in self-reports of inquiry across the three groups ($F_{2,281} = .64, p = \text{n.s.}$), but it did uncover a significant difference in reports of monitoring ($F_{2,285} = 6.93, p = .01$). A Scheffé test of differences among the three means indicated that sales personnel reported undertaking significantly more monitoring than did either clerical or technical support personnel. Thus, though respondents do not show wide variability in self-reports of monitoring and inquiry, the tendency of sales personnel to report more frequent monitoring must be noted. From these data, we cannot tell whether sales employees are biased in their reports of monitoring or whether they in fact monitor more frequently for feedback on their behavior.

A final limitation of the research is that it tested propositions about feedback-seeking with respect to only one goal, performing well on the job. Although it was proposed that the process may vary depending on various characteristics of goals, the correlated dependent measures across goals did not allow examination of goal-related differences in this research. It may be that goals such as performing well and maintaining potential for advancement are in fact correlated in the minds of most employees. Other goals, such as acceptance by a workgroup of various goals related to self-presentation, may provide a more useful contrast in future research.⁴

Areas for Future Research

Within the limits of self-reported cross-sectional data, this research does suggest that individuals actively adapt to settings that are new, uncertain, or troublesome by seeking out information useful in regulating their behavior. They do so both by observing others and drawing inferences about ways in which they might change their behavior to survive and succeed in those settings, and by directly asking others for assessments of their behavior.

These simple empirical observations raise a host of researchable questions concerning feedback-seeking. For instance, how do individuals combine the feedback they seek with that spontaneously given to them? If two messages are discrepant, which has more weight when individuals draw conclusions about their performance? Do they resolve discrepancies in favor of self-generated feedback or in favor of feedback volunteered by others?

This research examined only one strategy of adapting to a work setting. Future research needs to broaden this picture by specifying the relationship between this strategy and others individuals may employ. White (1974), for example, argued that individuals must also maintain freedom of movement and satisfactory internal conditions for response in order to adapt. Future research should simultaneously address these preconditions and shift attention to dependent variables that tap some of the consequences of successful and unsuccessful adaptation. For example, it is not clear whether active feedback-seeking leads to better or worse performance of tasks. Active seekers may attain their goals more efficiently than inactive seekers, or they may get bogged down by responding affectively to the various feedback messages they read or ask for. Accurate negative appraisals, for example, may be demoralizing for some individuals. The desire to avoid this experience may affect subsequent adaptation if an individual begins seeking not to determine the errors in a course of action, but rather to confirm the utility of that course of action.

Future research should also specifically address the effects of organizational contexts on individual's feedback-seeking behavior. This study conceptualized feedback-seeking as an individual psychological phenomenon. However, organizational structure and technology and the demography of a

⁴ Credit for this suggestion goes to an anonymous reviewer.

particular workgroup may all affect feedback-seeking by creating settings in which feedback is more or less accessible to individuals. Information-sharing norms may also affect feedback-seeking behavior (DeWhirst, 1971). Methodologies that involve repeated measurement could address issues that reflect the ongoing process of seeking. Crawford (1974), for example, suggested that individuals will seek feedback only if they have received useful information from doing so in the past. Research might address other attributes of messages that could affect the process of search. These attributes might include the affective sign of the feedback obtained and whether or not the first piece of feedback encountered diverges from or confirms an individual's own evaluation.

For managers, an understanding of feedback-seeking processes may be helpful in clarifying several issues. What cues do they give that are—perhaps wrongly—interpreted as feedback? What situations cause individuals to desire feedback? How might they make this information more accessible to their employees, either directly, or by influencing norms about information-seeking and sharing? Qualitative studies suggest that individuals do in fact look for feedback in managers' actions. Turner (1971), for example, noted that in an organization, remarks or pronouncements by a chief executive are "ransacked for latent meanings" and that "any aspect of his behavior may be treated as if it contained messages for others in the organization" (1971:108). Through a systematic investigation of what information and feedback individuals need, what strategies they use to obtain it, and where they go wrong in the process, managers may be able to help employees to interpret their organizational contexts more accurately.

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APPENDIX

All items used to measure the constructs tested in this research appear below. Unless otherwise noted, items used a 5-point response format anchored by strongly agree and strongly disagree. "R" indicates reverse scoring.

Independent Variables

1. Importance of performance goal:

How important are the following goals to you in your current setting at (X)?

Good performance in your present job (5-point response format from very important to very unimportant)

Of all the goals I have at (X), I value performing well the most.

I wouldn't feel good about myself if I weren't performing well.

2. Uncertainty about appropriate behaviors and potential evaluations⁵:

It is unclear to me exactly what I should do in order to perform my job better.

I really get little useful information about performance standards within my department.

Information about how my performance will be evaluated has been directly communicated to me. (R)

People around here give pretty consistent information about what we can do to perform better in our jobs. (R)

3. Organizational tenure:

How long have you worked for (X)? Year(s) _____ Month(s) _____

4. Job tenure:

How long have you worked at the job you presently hold? Year(s) _____ Month(s) _____

5. Negative beliefs about potential for goal attainment⁶:

How well do you believe you are performing in your current job? (5-point response format ranging from very well to very poorly)

My performance may not be adequate for this organization.

Others may rate my performance as below standard.

6. Self-confidence⁷ (5-point response formats ranging from completely true to completely false):

I sort of only half believe in myself. (R)

I feel that I am a person of worth, on an equal plane with others.

I seem to have a real inner strength in handling things. I am on a pretty solid foundation and it makes me pretty sure of myself.

I am frequently bothered by feelings of inferiority. (R)

7. Effort in feedback-seeking:

The way things are set up around here, it would take a lot of effort to get feedback from others.

I can get feedback from others with little effort whenever I want it. (R)

How much effort does it take for you to get useful feedback from the following sources? (4-point response format including a lot, some, a little, and none at all)

Your boss

Your co-workers

8. Risk in feedback-seeking:

I think my boss would think worse of me if I asked him/her for feedback.

I would not be nervous about asking my boss how he/she evaluates my behaviors. (R)

It is not a good idea to ask your co-workers for feedback; they might think you are incompetent.

It is embarrassing to ask my co-workers for their impression of how I am doing at work.

⁵ See Heslin and colleagues (1972) for the derivation of this measure of the uncertainty construct.

⁶ High scores represent more negative beliefs.

⁷ Items drawn from self-esteem scales presented in Robinson and Shaver (1973).

It would not bother me at all to ask my boss for feedback. (R)
 It is not a good idea to ask your boss for feedback; he/she might think you are incompetent.
 It is embarrassing to ask my boss for feedback.
 I think my co-workers would think worse of me if I asked them for feedback.
 I would not be nervous about asking my co-workers how they evaluate my behaviors. (R)
 It is better to try and figure out how you are doing on your own rather than ask your co-workers for feedback.

9. Amount of feedback recently received (4-point response format—a lot, some, a little, and none at all):

How much feedback information have you received recently from the following sources about your performance?

From your boss

From your co-workers

Using your own thoughts and feelings

From the task itself

From friends outside the organization and/or your spouse

10. Value of feedback about performance behaviors:

It is important to me to receive feedback on my performance.

I would like to get more feedback on what behaviors will help me do better in performing my job.

I find feedback on my performance useful.

It is important for me to receive feedback on my potential for advancement within (X).

I would like to get more feedback on what behaviors will help me advance within the company.

I find feedback on my advancement potential useful.

Feedback-Seeking^a

11. Frequency of monitoring about performance behaviors:

In order to find out how well you are performing in your present job, how FREQUENTLY do you (5-point response format ranging from very frequently to very infrequently)

Observe what performance behaviors your boss rewards and use this as feedback on your own performance?

Compare yourself with peers (persons at your level in the organization)?

Pay attention to how your boss acts toward you in order to understand how he/she perceives and evaluates your work performance?

Observe the characteristics of people who are rewarded by your supervisor and use this information?

12. Frequency of inquiry about performance behaviors:

In order to find out how well you are performing in your job, how FREQUENTLY do you (5-point response format ranging from very frequently to very infrequently)

Seek information from your co-workers about your work performance?

Seek feedback from your supervisor about your work performance?

Seek feedback from your supervisor about potential for advancement within the (X) system?

^a These items were chosen on the basis of a pretest conducted in a different utility in a different state. They were drawn from separate factors representing each strategy (monitoring and inquiry) for the two goals the study originally was to test. Items were included if they loaded higher than .60 on a factor and no higher than .30 on any other factor.

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EMPLOYEE VOICE AND EMPLOYEE RETENTION

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This study investigates the relationship between the extent to which employees have opportunities to voice dissatisfaction and voluntary turnover in 111 short-term, general care hospitals. Results show that, whether or not a union is present, high numbers of mechanisms for employee voice are associated with high retention rates. Implications for theory and research as well as management practice are discussed.

The relationship between the job satisfaction and employee turnover has been one of the most widely studied but least understood relationships in the organizational behavior literature. The consistently low correlations between job satisfaction and turnover found in empirical research on the topic clearly indicate that the relationship is not direct. Many processes may intercede either to cause satisfied employees to leave organizations or dissatisfied employees to remain with organizations. Previous research has proposed and tested a number of moderators that might clarify the relationship between job satisfaction and turnover (March & Simon, 1958; Mobley, Griffeth, Hand, & Meglino, 1979; Price, 1977). The two most prominent have been (1) the number of employment alternatives employees who are considering leaving an organization have, and (2) nonwork-related influences such as a spouse's immobility. Also, research has recently centered around testing Mobley's (1977) model of the process of employees' decisions on turnover in attempts to better understand those cognitive and behavioral processes that mediate the relationship between affective reactions to jobs and turnover. But even though scholars have expended much effort in theorizing about and researching the relationship between job satisfaction and turnover, consistently weak empirical relationships are still found.

Steers and Mowday (1981) suggested a heretofore neglected process that may intervene in the relationship in question: employees' efforts to change dissatisfying work situations that would otherwise be major factors in their decisions to leave their organizations. Employees who succeed in changing dissatisfying work situations will lower their dissatisfaction; with intent to

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leave changed to intent to remain, the likelihood increases that these employees will ultimately remain with their organizations. Up until recently, then, the literature on turnover has focused on only one of several alternatives open to individuals faced with dissatisfying work situations, leaving; it has ignored the alternative strategy of attempting to change such situations.

HIRSCHMAN'S CONCEPTS OF EXIT AND VOICE

The proposed relationship between employees' efforts to change dissatisfying work situations and turnover is implicit in much of the work of Albert Hirschman (1970, 1974), whose perspective served as the theoretical foundation for the present research. He extensively studied responses to declining firms in terms of *exit* and *voice*. The two terms refer to two options that members or clients of an organization have when responding to an economically dissatisfying relationship with that organization. The source of dissatisfaction might be declining quality of the organization or declining quality of its products. To *voice* dissatisfaction is to try to change a problematic situation, and to *exit* is simply to withdraw from and leave the problematic situation. Most of Hirschman's work is grounded in economics and thus focuses primarily on the clients of an organization using *voice* or *exit* rather than on its members using these options. Hirschman's concepts are gaining increasing attention in the organizational behavior literature (Farrell, 1983). This attention is not limited to studies of employee turnover; other relevant work includes research on absenteeism (Hammer, Landau, & Stern, 1981), political behavior (Farrell & Peterson, 1982), organizational due process (Aram & Salipante, 1981), organizational dissent (Graham, 1986), and the cathartic effects of *voice* (Greenberg & Folger, 1983).

EMPLOYEE TURNOVER AND THE LABOR RELATIONS LITERATURE

Unions can be viewed as vehicles for the collective voicing of employees' dissatisfactions. Previous research has demonstrated that unionism is clearly associated with employee stability. Freeman and Medoff (1984), reviewing their own and others' analyses of individual behavior and industry aggregates, demonstrated that unionization is consistently and significantly associated with retention of employees if wage rates and other known predictors of employee exit are controlled for. The control of wage rates is critical in order to differentiate the effects of unions in terms of *voice* from any monopoly effects due to union control of equivalent jobs.

The research Freeman and Medoff (1984) reviewed is without exception based on analyses of very large data sets like the National Longitudinal Survey.¹ Such data sets constrain the specific relationships that can be studied and the levels of analysis at which such relationships can be examined. In particular, very little research exists on the effects of unionization on

¹ This survey was conducted by the Center for Human Resource Research, Ohio State University.

quitting rates in organizations. Becker (1978) conducted such an organization level study, examining the effects of unionization on rates of quitting for individuals in low-wage occupations in short-term, general care hospitals. Contrary to results at other levels of analysis, Becker found a weak, marginally significant relationship ($p < .10$) between unionization and rate of turnover while controlling for monopoly effects and a wide variety of other known predictors of employee exit.

The generalizability of research like Becker's (1978) is limited; such work is usually specific to the occupation, organization, and region studied.² However, when an investigator controls data collection, a study is more likely to include predictors of exit that are not captured in studies using existing data bases. For example, Becker examined the effects of fringe benefits on rates of quitting in addition to the effects of wages. Freeman and Medoff (1984) noted that a major criticism of research on unions' effects in terms of voice is that most existing data sets do not include information on a principal monetary reward such as fringe benefits and thus do not fully control for monopoly effects. Another significant criticism of research on voice effects of unions is Ulman and Sorensen's (1984) demonstration that, for unionized employees, the effects of strikes and the threat of strikes provide other alternatives to quitting besides voice realized through the union grievance mechanism.

Thus, accurately assessing the effects of employee voice on numbers of exits requires more than assessing the effect of unionization. It requires exploring the effects of mechanisms, whether union mandated or not, that organizations put in place to enhance their employees' opportunities for voicing dissatisfaction. This approach necessitates collecting data specifically for this purpose instead of using an existing data base. This study employed a data collection strategy similar to that used by Becker (1978).

HYPOTHESES AND STUDY DESIGN

Study One

Two studies provided data for this research. The first sought to determine if there is a direct relationship between (1) the amount of opportunity an organization gives its employees to voice dissatisfaction and change dissatisfying work situations, and (2) the organization's rate of employee retention. Thus,

Hypothesis 1: There will be a significant and negative relationship between the total number of voice mechanisms for employees that an organization has and the voluntary turnover rate among the organization's employees.

² Becker (1978) surveyed hospitals in three contiguous states in the north central United States.

The focus here was on the amount of opportunity available for voice and not on the quality of that opportunity; the second may, in fact, be a more viable determinant of retention. Employee voice mechanisms examined in this research included grievance procedures, suggestion systems, employee-management meetings, counseling services, ombudsman services, non-management task forces, question and answer programs, and survey feedback.

The following known predictors of rate of employee turnover were controlled for in this study: wage rate, the ratio of fringe benefits to total compensation, unemployment rate, number of grievances filed (a surrogate for job dissatisfaction), percentage of minority employment, organizational size, and occupation-specific employment opportunities in the region (see Becker, 1978). The effect of unionization of the workforce on the rate of employee retention was examined separately, but for the purposes of this study, it is included as a control variable. This study examined only the retention rates of an occupation dominated by women that has a documented shortage of workers: registered nursing. Short-term, general care hospitals that universally employ continuing education for registered nurses were studied. This population was chosen to control for unwanted variance due to differences in total employment accounted for by women, shortage of workers, availability of continuing education, occupational type, and organizational type.

Study Two

The first study did not assess the quality of the hospitals' voice mechanisms. A second analysis was conducted to examine the relationship between the number of mechanisms offering employees the option of voice in an organization and employees' perceptions of the effectiveness of these mechanisms. From four hospitals participating in the first study, data were collected on registered nurses' expectancies for resolving work related problems and their perceptions of the general effectiveness of their organizations' voice mechanisms. It was proposed that,

Hypothesis 2: A high number of employee voice mechanisms will be positively related to high expectancies of problem resolution among employees and high levels of effectiveness for the organization's problem resolution procedures.

STUDY ONE

Methods

Sample. Organizations were the units of analysis in this study. Participating organizations were short-term, general care hospitals ranging from 50 to over 1,000 beds in size. A systematic sample of presidents and executive directors of hospitals in the north central United States was drawn from the American Hospital Association membership directory. These administrators

received questionnaire packages with a cover letter requesting them to forward the questionnaire and the return envelope provided to their hospitals' personnel directors. In most cases, personnel directors or members of personnel staffs completed the questionnaires. Out of a sample of 278 hospitals, individuals in 129 of them completed and returned questionnaires for a response rate of 46.4 percent. Previous studies using similar strategies for data collection have yielded response rates below 30 percent (Becker, 1978). Of the hospitals participating in the study, 13.9 percent that did not supply data on employee turnover were removed from the final sample. Data from 111 short-term, general care hospitals, 15 of which had unionized registered nurses, were analyzed.

Employee voice mechanisms. The questionnaire asked whether or not a hospital's registered nurses were subject to the following employee-relations practices: (1) formal grievance procedure, (2) suggestion system, (3) employee-management meetings, (4) counseling service, (5) ombudsman, (6) non-management task forces, (7) question and answer program, and (8) survey feedback. A composite index of employee voice mechanisms was created by simply summing the number of these mechanisms that an organization employed (Kuder-Richardson Formula 20 = .55).

Turnover among registered nurses. Each hospital administrator was asked to supply the rate of voluntary turnover for its registered nurses for the previous 12-month period.

Control variables. The questionnaire sought the following numerical information on a hospital's registered nurses: (1) wage rate per hour, (2) ratio of fringe benefits to total compensation, (3) number of grievances they filed, and (4) percentage of minority employment. It also asked the hospital's size (number of beds) and the number of hospital beds in the county to appraise alternative employment opportunities in the region. In addition, it asked if registered nurses were unionized. Finally, unemployment rates for each hospital's county and standard metropolitan statistical area (SMSA) for the 12-month period under study were obtained from the research and statistics departments of state employment security divisions.

Results

Table 1 gives means and standard deviations of the study's variables. The mean rate of turnover among registered nurses was 21.1 percent (s.d. = 11.5). Table I also provides Pearson correlations between variables. All correlations between variables and turnover were in the predicted direction with the exception of the positive correlation³ between wage rate and turnover.

³ There is a potential explanation for this finding that Becker (1978), who found similar results, did not consider. For hospitals with production functions that require high levels of staffing at all hours, average hourly wages are higher because they pay premium differentials for staffing undesirable shifts. In such circumstances, particularly with a shortage of nurses, it would not be surprising that turnover would be high as employees would leave for more desirable shifts with other organizations.

TABLE 1
Means, Standard Deviations, and Intercorrelations for Variables in Study One^a

Variables	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Turnover among registered nurses	21.1%	11.5	—															
Employee voice mechanisms ^b																		
2. Grievance procedures ^c	1.94	.23	-.28*	—														
3. Survey feedback	1.50	.50	-.24*	.07	—													
4. Ombudsman	1.11	.31	-.13	-.03	.04	—												
5. Question-and-answer program	1.53	.50	-.17*	.05	.31*	.04	—											
6. Employee-management meetings	1.81	.39	-.01	.15	.13	.10	.24*	—										
7. Counseling service	1.78	.41	-.15	.22*	.16*	.12	.17*	.27*	—									
8. Suggestion system	1.60	.49	-.02	.01	.15*	.19*	.22*	.17*	.03	—								
9. Nonmanagement task forces	1.38	.49	-.02	-.10	.24*	.01	.23*	.24*	.21*	.10	—							
Control variables																		
10. Hourly wage rate	8.3	0.8	.27*	.15	-.07	-.07	.01	.17*	.11	.01	-.09	—						
11. Fringe benefits	25.2	6.6	-.01	.11	.18*	.04	.09	.11	.20*	-.09	.15	.14	—					
12. County unemployment rate	8.1	3.0	-.12	-.06	.12	.02	-.02	-.09	.07	-.04	-.09	-.02	.10	—				
13. Grievances filed	9.6	14.0	.13	-.43*	.06	-.01	.15	-.03	-.08	.00	.16*	-.05	-.08	.12	—			
14. Minority employment	8.4	16.7	.17	.06	.10	.09	-.04	.12	.13	.04	-.02	.20*	.24*	.04	-.03	—		
15. Beds in hospital	375.2	258.1	.13	-.06	-.01	-.04	.09	.10	.10	-.07	.11	.36*	.24*	.00	.15	.00	—	
16. Hospital beds in county	3592.4	4297.7	.18*	.13	-.06	.02	-.06	.17*	.05	-.07	-.02	.51*	.08	.07	-.10	.36*	.41*	—
17. Unionization ^b	1.1	0.3	-.05	.09	-.10	.04	-.04	.05	-.04	-.10	.17	.10	-.02	.10	-.16*	-.09	.00	-.04

^a Descriptive data are based on Ns ranging from 100 to 129; correlations are based on approximately N = 111.

^b Coded 2 if present, 1 if not present.

^c Mean turnover rates: with grievance procedures, 20.5 percent, without grievance procedures, 37.4 percent ($t = 2.97, p < .01$); mean turnover rates in hospitals with grievance procedures: unionized, 19.5 percent, nonunionized, 20.6 percent ($t = 0.46, n.s.$).

* $p < .05$.

It was hypothesized that the more opportunities employees have to voice dissatisfaction and have input into changing dissatisfying work situations, the greater the number of employees that will remain with an organization. The composite index of employee voice mechanisms correlated negatively with turnover among registered nurses ($r = -.24, p < .05$); the greater the number of employee voice mechanisms that a hospital employed, the lower the turnover. This significant relationship between the composite index and rate of turnover holds when a number of known predictors of employee turnover are statistically partialled out (see Table 2).

Ordinary-least-squares regression was considered appropriate for multivariate analysis of the data (cf. Kochan & Helfman, 1981). As indicated in Table 2, the multiple correlation of the linear combinations of all control variables, except for unionization, with turnover was $R = .36$. Adding unionization to the predictive equation did not increase the multiple correlation with turnover. Finally, adding the composite index of employee voice mechanisms, including the unionization variable, to the predictive equation significantly increased the multiple correlation with turnover to $R = .45$ and the explained variance in the dependent variable to $\Delta R^2 = .07$. This significant ($t = 2.6, p < .05$) increase is reflected by the twofold increase in R^2 corrected for shrinkage. Therefore, number of employee voice mechanisms is significantly associated with rate of turnover among registered nurses

TABLE 2
Results of Hierarchical Regression Analyses of Unweighted
Composite Index of Employee Voice Mechanisms, Unionization,
and Control Variables on Registered Nurse Turnover^a

Independent Variables	Step 1: Control Variables			Step 2: Assessment of Unionization Effect			Step 3: Assessment of Voice Effect		
	<i>b</i>	β	<i>t</i> ^b	<i>b</i>	β	<i>t</i> ^b	<i>b</i>	β	<i>t</i> ^b
Hourly wage rate	3.31	.23	1.8	3.37	.23	1.8	3.55	.24	1.9
Fringe benefits	-.10	-.06	-0.5	-.10	-.06	-0.5	-.03	-.02	-0.1
County unemployment rate	-.53	-.14	-1.3	-.52	-.14	-1.2	-.73	-.19	-1.7
Grievances filed	.04	.15	1.4	.04	.15	1.3	.04	.16	1.4
Minority employment	.09	.13	1.1	.09	.13	1.1	.11	.16	1.3
Beds in hospital	.00	.03	0.2	.00	.02	0.2	.00	.05	0.4
Hospital beds in county	.00	.03	0.2	.00	.03	0.2	.00	.00	0.0
Unionization				-.72	-.02	-0.2	-.66	-.02	-0.2
Employee voice mechanisms							-1.92	-.28	-2.6*
Constant	-2.67			-3.02			3.68		
<i>R</i>		.36			.36			.45*	
<i>R</i> ²		.13			.13			.20	
Adjusted <i>R</i> ²		.05			.04			.10	

^a Deletion of missing data reduced the number of hospitals on which regression analyses were conducted to 81.

^b Partial *t*.

* $p < .05$.

when a large number of known predictors of employee turnover are controlled.

In the composite index employed, each employee voice mechanism received equal weight. When a weighted linear combination of the components of this index was created through regression analysis, the multiple correlation with rate of turnover among registered nurses was $R = .41$. Little confidence can be placed in this weighted combination of variables, however, because when the sample was split into two subsamples composed of even and odd cases, the regression coefficients were not stable and the two subsamples failed to double-cross-validate at an acceptable level ($r = .16$, n.s.; $r = .31$, $p < .05$).

STUDY TWO

Methods

Sample. Four hospitals that participated in study one volunteered to allow a survey of nonsupervisory registered nurses' perceptions of their organizations' voice mechanisms. In two hospitals, one with 53 beds and the other with 250, questionnaires were administered on site during working hours; response rates were 44.4 and 23.7 percent. In the second two hospitals (107 and 112 beds), personnel departments distributed questionnaires with return envelopes addressed to the researcher to be filled out at the employees' convenience; response rates were 42.8 and 27.3 percent. All nonsupervisory registered nurses currently on staff at the hospitals received questionnaires; participation was voluntary.

Nurses' perceptions. Nurses estimated how often they felt they would be effective in resolving eight work-related problems. The response format ranged from 10 to 100 percent of the time on 10-percent intervals. Problems given were related to supervision, tasks, co-workers, pay, or promotions. Two items represented each of the first three types of problems and one item represented each of the last two types. The reliability for the eight-item composite measure of expectancy of problem resolution was satisfactory ($\alpha = .86$).

The questionnaire also asked the extent to which nurses agreed or disagreed with a series of ten statements (see Appendix) designed to reflect the extent to which the management of their organizations effectively responded to and used employee voice ($\alpha = .89$). Finally, three one-item measures asked employees the extent to which they agreed or disagreed with three statements (see Appendix) designed to assess their perceptions of the effectiveness of voice mechanisms, the utility of efforts to change dissatisfying situations, and their preference for leaving versus attempting to resolve dissatisfaction.

Results

Table 3 gives means and standard deviations of these variables as well as Pearson correlations. All correlations are in the expected direction.

TABLE 3
Means, Standard Deviations, and Intercorrelations for Variables in Study Two^a

Variables	Means	s.d.	1a	1b	1c	1d	1e	1f	2	3	4
1. Expectancy of problem resolution											
a. Supervisory problems	4.2	2.3	—								
b. Task problems	5.3	2.6	.39	—							
c. Co-worker problems	5.4	2.5	.29	.53	—						
d. Pay problems	3.2	2.3	.24	.30	.37	—					
e. Promotion problems	3.8	2.6	.46	.30	.37	.56	—				
f. Composite expectancy	4.6	1.8	.70	.77	.76	.59	.67	—			
2. Management's responsiveness to voice	3.5	1.2	.31	.40	.34	.19	.25	.44	—		
3. Effectiveness of voice mechanisms	2.8	1.5	.07	-.02	.08	.07	.11	.09	.56	—	
4. Utility of efforts to change dissatisfying situations	4.0	2.0	-.13	-.15	-.19	-.05	-.15	-.20	-.47	-.41	—
5. Preference for leaving versus attempting to resolve dissatisfaction	2.7	1.3	-.06	-.27	-.23	-.16	-.23	-.28	-.33	-.14	.36

^a Correlations are based on the combined standardized data from each of the four hospitals participating in the study ($N = 102$; $r \geq .16$, $p < .05$).

TABLE 4
Registered Nurses' Perceptions and Relevant Organizational Characteristics
of Four Nonunion, Short Term, General Care Hospitals with Varying
Numbers of Employee Voice Mechanisms^a

Variables	High Opportunity for Voice		Low Opportunity for Voice	
	Hospital 1	Hospital 2	Hospital 3	Hospital 4
Relevant organizational characteristics				
Number of beds	52	250	112	107
Grievance procedure	Yes	Yes	Yes	Yes
Suggestion system	Yes	No	No	Yes
Employee-management meetings	Yes	Yes	No	Yes
Counseling service	No	Yes	No	No
Ombudsman	Yes	No	No	No
Nonmanagement task forces	Yes	Yes	No	No
Question-and-answer program	No	No	Yes	No
Survey feedback	Yes	Yes	Yes	No
Total number of mechanisms	6	5	3	3
Turnover among registered nurses	8.3%	20.7%	10.8%	33.3%
Turnover among licensed practical nurses	16.6%	19.4%	21.6%	28.6%
Total organizational turnover	15.0%	23.1%	26.4%	40.0%
Perceived expectancy and effectiveness				
Problem resolution expectancies				
Supervisory problems	59.4%	43.5%	34.5%	45.0%
Task problems	67.5% ^b	58.7%	41.3%	55.0%
Co-worker problems	75.6% ^b	56.2%	47.7%	49.7%
Pay problems	28.7%	30.9%	30.9%	37.3%
Promotion problems	36.2%	42.4%	31.5%	43.3%
Composite expectancy	58.7% ^b	48.7%	38.7%	47.5%
Management's responsiveness to voice	4.20 ^b	3.88	2.81	3.45
Effectiveness of voice mechanisms	2.87 ^b	3.48	1.91	2.60
Utility of efforts to change dissatisfying situations	3.88 ^b	3.68	2.16	2.47
Preference for leaving versus attempting to resolve dissatisfaction	2.62 ^b	2.20	3.34	2.80

^a Ns = 8, 46, 33, 15, respectively, for Hospitals 1-4.

^b t-test significant at the $p < .01$ level (combined perceptions for Hospitals 1 and 2 compared to combined perceptions for Hospitals 3 and 4).

Table 4 reports levels of expectancy and perceptions of the effectiveness of voice mechanisms for hospitals with varying numbers of voice mechanisms. Hospitals 1 and 2 had six and five mechanisms respectively, and hospitals 3 and 4 had three mechanisms apiece. When these hospitals are treated as two groups, t-tests for differences between means indicate significantly higher levels of expectancy and perceptions of voice effectiveness in the pair of hospitals with the larger numbers of voice mechanisms. These differences emerged for all variables except expectancies for resolving problems related to supervision, pay, and promotion. These findings support the hypothesis that employees of hospitals with large numbers of

employee voice mechanisms will have high expectancies for problem resolution and will perceive a high level of effectiveness in their organizations' responses to employee voice.

These results should be interpreted with caution. First, the measures of employee perception are intercorrelated (see Table 3). Second, Table 4 reports separate means for each hospital in order to indicate the extent to which these means differ within each of the two designated groups. As these data clearly indicate, hospital 1 tended to have the highest levels of expectancy and perceptions of voice effectiveness and hospital 3 consistently had the lowest levels. More important, although hospital 2 had more voice mechanisms than hospital 4, the levels of expectancy and perceived effectiveness of voice mechanisms were only slightly higher for hospital 2 in most cases. The rate of turnover among registered nurses was also higher for both hospitals 2 and 4 than for the other hospitals. Although extrapolation to other turnover figures is somewhat problematic, Table 4 does indicate that voluntary turnover for licensed practical nurses and the organization as a whole was higher for the hospitals with the fewest employee voice mechanisms.

DISCUSSION

The results of study one suggest that the more an organization gives employees the opportunity to voice dissatisfaction over aspects of their work in order to change dissatisfying work situations, the greater the likelihood that its employees will remain with the organization. Registered nurses' turnover rates in short-term, general care hospitals were significantly lower in hospitals with many mechanisms for the voicing of employees' dissatisfaction. In addition, this relationship held with statistical control for a wide variety of known predictors of rate of employee turnover.

The results of study two, although only suggestive, indicate that high numbers of voice mechanisms are associated with high levels of employees' expectancies for problem resolution and high perceived effectiveness of an organization's procedures for resolving problems. These findings also lend credibility to the construct, number of employee voice mechanisms. This implies that when employees have many opportunities to voice dissatisfaction they (1) appear to be predisposed to take advantage of those opportunities, and (2) appear to consider procedures for problem resolution effective.

Although previous research has consistently found an effect for unionization on retention rate, this research did not find such an effect. Uniqueness in the types of organization and occupation examined may account for these negative results. Unionization's effects on voice may have been washed out. Data indicated that unionized hospitals averaged 4.42 mechanisms and nonunionized hospitals averaged 4.52 mechanisms; in addition, no significant differences emerged when each mechanism was considered individually. Perhaps this finding is a result of a union-threat effect; nonunionized hospitals may provide voice mechanisms that would otherwise be provided by

unions in order to reduce dissatisfaction and thus reduce the threat of unionization.⁴

The strengths and limitations of this research are worth considering. This research extended previous work on unions' effects on rates of employee retention by looking at the potential effects of voice mechanisms themselves. Organizations might institute these mechanisms as a result of unionization or in attempts to improve management process. Additional strengths are that this research controlled for a wide variety of potential predictors of rate of turnover and included critical information on employees' perceptions of the organizational characteristics under investigation.

A limitation is that this research does not represent a complete picture of the phenomena involved in the relationship between the options of voice and exit. Two omissions are worthy of note. First, Hirschman's (1970) model focused on exiting in silence versus staying and voicing concerns. Additional options open to employees, such as staying in silence and exiting with voice, need to be incorporated into the model (Barry, 1974; Birch, 1975). In fact, Birch (1975) argued that in many cases people are more likely to exit with voice than to remain and engage in voice, particularly when there is a possibility of retaliation. Second, this research did not address the issue of loyalty. Hirschman (1970) hypothesized that those clients or employees who have greater loyalty to a product or an organization will be more likely than others to respond with voice to correct a perceived decline in organizational performance. Barry has criticized the loyalty concept as an "ad hoc equation filler" (1974: 95) that could be inversely as well as positively correlated with voice (see also Laver, 1976). But it is difficult to deny that loyalty in the form of behavioral commitment to an organization—entrenchment due to length of service—is likely to have an inverse relationship with employees' exit rates, whether or not employees have successfully changed dissatisfying states of affairs (Mowday, Porter, & Steers, 1982).

An important limitation, addressed in the introduction, is that the actual quality of the voice mechanisms under study was unknown. The second study indirectly addressed this issue by assessing employees' perceptions of the effectiveness of voice mechanisms. This assessment, however, cannot substitute for an approach that would ideally involve in-depth content analysis of the nature and quality of each employee voice mechanism at each organizational site under study. This research assessed employees' perceptions of the effectiveness of voice mechanisms at only four of the organizations represented in the larger study; in addition, sample sizes for these analyses were small and measures whose psychometric properties were relatively unknown were constructed and used.

⁴ Curtin (1970) found that unsuccessful unionization attempts generally result in improved communication practices; in over 60 percent of the companies these practices usually included: "establishment of regular meetings with the employees, institution of a formal grievance procedure, formation of an office committee, concerted effort to deal promptly with employee complaints" (1970: 67).

Another limitation of this research is that although significant relationships emerged from the analysis, they are not very strong. Also, these relationships are purely associational and thus causality cannot be assumed. A related problem concerns synchronicity of the data; assessment of number of voice mechanisms was made at the end of the one-year period for which retention data was collected. Another limitation is that the research was conducted in one particular type of organization and on one specific occupational classification. A further limitation is the relatively low response rate; however, comparing the responses obtained against population demographics provided by each of the hospitals and bed sizes obtained from the National Center for Health Statistics indicated that the responses were representative of the population of individuals and of hospitals involved. Future research should incorporate tests of the hypotheses in different populations and use research methodologies where causality could be inferred as well as strategies of data collection that would improve rates of response.

The findings of this study reinforce Steers and Mowday's (1981) assumption that investigations of the process of employee turnover need to consider employees' efforts to change unsatisfactory work situations. On the organizational level of analysis, future research should consider not only formal voice mechanisms and their quality, but also informal organizational cultures that create and sustain those mechanisms. It is not inconceivable that the rough assessment of total numbers of voice mechanisms that this study used is tangible evidence of a potentially salient organizational component such as managerial philosophy. The individual level of analysis needs a model of the process of turnover decisions that incorporates the two major alternatives available to employees: (1) searching for alternative employment to exit from a dissatisfying work situation, and (2) attempting to change a dissatisfying work situation in an effort to remain. Mobley's (1977) model of the process of turnover decisions focused only on the first course of action. But what causes employees to take one course of action before the other or to take both courses of action simultaneously? Perhaps employees' commitment and expectancies concerning the effectiveness of voice mechanisms and procedures for problem resolution would play a significant role in this process.

If future research supports the hypotheses examined in this study, one practical implication is that organizations may be able to effectively reduce employee turnover by increasing the sophistication of their processes for resolving complaints. Employees who search for alternative employment without attempting to change dissatisfying work situations give organizations no indication that anything is wrong until after they find other work and hand in their resignations. By listening to, encouraging, and providing mechanisms for employees who want to change dissatisfying work situations, perhaps organizations could prevent employees' forming an intent to leave. In addition, organizations that engage in such activities should be able to obtain information from employees that could improve the effectiveness of

these organizations (Freeman, 1976; Hirschman, 1976), information that is not available when employees silently leave.

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APPENDIX

All items used 7-point response formats; "R" indicates reverse scoring.

Management's responsiveness to voice mechanisms:

The management of my organization is not interested in resolving individual employee problems. (R)

The management of my organization encourages employees to voice their problems.

The management of my organization has not provided enough mechanisms (for example, suggestion systems, grievance procedures, etc.) to allow employees to effectively voice their dissatisfaction. (R)

I get the feeling that my superior does not want to hear about my complaints. (R)

The personnel manager is open to receiving complaints.

My boss comes around regularly to keep in touch with any complaints that I may have.

The personnel manager makes an effort to keep in touch with any complaints that workers have.

I feel intimidated by my superiors when pursuing a grievance. (R)

Management views grievances as a challenge to their authority. (R)

The organization encourages suggestions to improve situations that are dissatisfying to employees.

Effectiveness of voice mechanisms:

The mechanisms to resolve employee problems of my organization are very effective.

Utility of efforts to change dissatisfying situations:

Attempting to change something at work that dissatisfies me would be a waste of time. (R)

Preference for leaving versus attempting to resolve dissatisfaction:

I would rather find a job elsewhere than attempt to change something at work that dissatisfies me.

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POSTTRAINING STRATEGIES FOR FACILITATING POSITIVE TRANSFER: AN EMPIRICAL EXPLORATION

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This study investigated the effectiveness of three posttraining strategies for facilitating transfer of training: (1) assigned goal setting, (2) participative goal setting, and (3) a behavioral self-management approach based on the relapse-prevention model. Results showed that both the assigned and participative goal setting conditions were superior to behavioral self-management and control conditions in inducing maintenance of behavioral change over a two-month period. The implications of these findings for training and future research are discussed.

Positive transfer has been defined as the extent to which individuals use what they learned in a training situation on the job (Wexley & Latham, 1981). Although previous investigators have long recognized the difficulty of achieving positive transfer (Fleishman, Harris, & Burt, 1955; McGehee & Thayer, 1961; Mosel, 1957), recent reviews of the literature on training (Goldstein, 1980; Wexley, 1984) indicate that this problem has seldom received the empirical attention it deserves. Similarly, authors such as Michalak (1981), Newstrom (1984), and Royer (1979) have concluded that the organizational literature has neglected the issue of positive transfer of training.

The critical need for empirical investigation of such transfer becomes apparent in light of the scope of industrial training in the United States and the estimated relapse rate of trainees (Newstrom, 1984). Recent published estimates indicate that more than 100 billion dollars is spent annually on training and development programs (Kelly, 1982). It is also estimated that only 10 percent of the dollars spent on training results in actual behavioral change back on trainees' jobs (Georgenson, 1982).

These disturbing figures have induced training researchers and practitioners to question traditional conceptions of how to maximize positive transfer. These traditional concepts include using identical elements, teaching underlying principles, and using overlearning (McGehee & Thayer, 1961). The concept of identical elements is that the presence of identical stimulus and response elements in a training and a job environment maximizes positive

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transfer (Osgood, 1949). Teaching underlying principles refers to the idea that transfer is facilitated when trainees learn not just applicable skills, but also the general rules and theoretical principles underlying the content of their training. Learning underlying principles is thought to enhance trainees' ability to use newly acquired skills in a different work environment (McGehee & Thayer, 1961). Overlearning refers to providing trainees with continued practice far beyond the point at which they have performed a task correctly several times (Wexley & Latham, 1981).

These traditional transfer strategies have value (Gagne, Baker, & Foster, 1950; Hasselrud & Meyers, 1958; Schendel & Hagman, 1982), but many authors have concluded that these approaches are not sufficient for achieving substantial positive transfer of training (Leifer & Newstrom, 1980; Michalak, 1981). A recurring theme in recent writings is that these traditional approaches are deficient because they focus only on the period of acquisition of skills within a training process. Leifer and Newstrom (1980) proposed that broadening this traditional perspective to include strategies for three time periods—before, during, and after training programs—might enhance transfer. The literature has focused primarily on the period after training as the crucial time to facilitate positive transfer (cf. Feldman, 1981; Leifer & Newstrom; Michalak). Although not explicitly stated, the majority of these posttraining strategies draw heavily on two concepts familiar to organizational researchers: goal setting and behavioral self-management.

Goal setting, of course, has been repeatedly demonstrated to be an effective motivational strategy for inducing behavioral change in a wide variety of settings (Locke & Latham, 1984). Only recently, however, has the training literature seriously discussed assigned and participative goal setting as possible posttraining transfer mechanisms (Anderson & Wexley, 1983; Feldman, 1981). Specifically, previous research has suggested that, after completing a training program, trainees should be assigned specific behavioral goals. In addition, trainees, supervisors, or both should complete behavioral progress reports to monitor the extent of their goal achievement back on the job.

As a secondary focus of their study, Wexley and Nemeroff (1975) incorporated assigned goal setting as an element of their management-development program for hospital supervisors. Trainees completed a two-day workshop designed to improve their leadership and interpersonal skills. After completing training, but before returning to work, trainees received a set of behavioral checklists and instruction in monitoring and recording their own on-the-job use of their new skills. The trainees were responsible for filling out the behavioral checklists three times a week in order to record their progress in achieving the program's behavioral goals. The specific items on the checklist were derived directly from the learning points of the training program. The results indicated that the treatment group using this assigned goal-setting approach was significantly better at applying learned skills than was a control group.

Although previous research suggests that there are few consistent differences between assigned and participatively set goals with respect to produc-

tivity (Dossett, Latham, & Mitchell, 1979; Latham & Marshall, 1982; Latham & Saari, 1979), several authors have advocated the use of participatively set goals rather than assigned goals for the specific purpose of facilitating positive transfer of training. Anderson and Wexley (1983), for example, proposed a strategy whereby trainees have the opportunity to set their own behavioral goals in collaboration with a trainer. These authors contended that this increases ownership of goals and consequently enhances transfer of training. Feldman (1981) discussed a similar approach, contracting, which requires trainees, in collaboration with trainers and supervisors, to enter into an agreement requiring trainees to achieve a set of mutually acceptable goals back on their jobs.

A second general category of posttraining strategies is grounded in the concept of behavioral self-management (Luthans & Davis, 1979; Marx, 1982). Luthans and Davis popularized the concept of behavioral self-management, which they defined as "deliberate regulation of stimulus cues, covert processes, and response consequences to achieve personally identified behavioral outcomes" (1979:43). This approach suggests that environmental stimuli, trainees' feelings about those stimuli, and the consequences that result from behavior all influence trainees' application of learned skills. Supporters of behavioral self-management propose that the strategy goes beyond traditional Skinnerian concepts by taking into account the critical mediating role of thoughts, feelings, and self-evaluative behavior. Further, it is thought to work by allowing trainees to create self-imposed and self-maintained systems of rewards and punishments that, in effect, buffer them from random demands and consequences imposed by others. Behavioral self-management helps trainees retain desirable behavior or diminish dysfunctional behavior by introducing appropriate cues in their environments, stimulating training-related thoughts and feelings, and fostering consequences that strongly influence their behavior.

Marx (1982) proposed use of a strategy termed relapse prevention, originally designed and successfully implemented in the treatment of addictive behaviors (Marlatt & Gordon, 1980; Perri, Shapiro, Ludwig, Twentyman, & McAdoo, 1984), as a transfer strategy employing behavioral self-management. As Marx noted, this approach seems particularly applicable as a posttraining transfer strategy for management development. The relapse-prevention model consists of both cognitive and behavioral components designed to facilitate long-term maintenance of learned behaviors by teaching individuals to understand and cope with the problem of relapse. In this context, the term relapse means reversion to pretraining behavior in certain on-the-job situations. Identifying the determinants of a treatment's failure is seen as the key to maintaining behavior. The model predicts that anticipating future failures and monitoring past and present ones will enhance long-term behavioral change. Data from these episodes of failure are used to equip trainees with appropriate coping skills for dealing with future difficult situations. Although relapse prevention does not explicitly include goal setting, the formation of coping strategies by trainees can be seen as a form of self-goal-setting.

It is clear from a review of the literature on transfer that most current authors, regardless of what particular posttraining strategy they espouse, support McGehee and Thayer's suggestion that additional training directly addressing the transition from "learning to doing" (1961: 177) best enhances transfer of learning. To date, most of the literature on posttraining transfer interventions has been conceptual rather than empirical. Therefore, the primary purpose of this research was to investigate empirically whether augmenting a time-management skills training program with a posttraining transfer strategy can in fact enhance positive transfer. Specifically, we examined the extent to which using one of three posttraining strategies derived from the transfer literature enhanced retention and application of trained time-management skills. The three strategies were (1) assigned goal setting, (2) participative goal setting, and (3) a self-control technique based on the relapse-prevention model. Thus, the study involved three treatment conditions and one control condition. Subjects in all four conditions were exposed to a time-management training program, and subjects in the treatment conditions were also randomly assigned to posttraining strategies. Assuming that significant effects would emerge, we also sought to examine the relative effectiveness of these three strategies for enhancing transfer of trainees' newly learned skills. We evaluated the effectiveness of the transfer strategies in terms of Kirkpatrick's (1976) multiple levels of evaluation: reaction, learning, and behavior.

METHODS

Subjects and Procedures

Subjects were 256 students enrolled in an upper-level management course at a large midwestern university; they participated in return for credit toward their grades. The group consisted of 143 women and 113 men. All subjects participated in a three-hour training workshop on improving time-management skills. A professional trainer, who specialized in conducting time-management programs for managers and was unaware of the purposes of the research project, conducted the workshop.

We chose time management as the topic of training because of its relevance for the subjects both as students and as future managers. The workshop focused on the following ten learning points: (1) establishing and writing down long-term goals; (2) linking short-term objectives and activities to long-term goals; (3) using a daily planner and constructing a daily to-do list; (4) prioritizing goals and activities with the ABC method; (5) using proven techniques, such as deadline setting and the swiss cheese method¹ for handling procrastination; (6) frequently applying the 80-20 rule² to help recog-

¹ The swiss cheese method is a time-management technique that involves "poking holes" (doing small parts) in major projects in order to get started and reduce procrastination.

² In this context, the 80-20 rule refers to the notion that if all of a day's tasks were arranged in order of their value for goal attainment, 80 percent of the value would come from only 20 percent of the tasks. This suggests a functionality to focusing on a very few high-value tasks even at the cost of ignoring many low-value tasks.

nize major time-wasters; (7) using tactful assertiveness to handle interruptions; (8) balancing internal and external time and blocking out internal prime time for major projects; (9) mastering time, not letting time master you (taking productive breaks, avoiding the time-nut trap³); and (10) avoiding indecision by acting now.⁴ Included in the workshop were lectures, group discussions, and a 28-minute film on the fundamentals of time management. After completing the workshop, each subject was randomly assigned to one of four conditions, either assigned goal setting, participative goal setting, relapse prevention, or control.

The 60 subjects (33 women, 27 men) in the assigned goal-setting condition attended a one-and-a-half hour transfer session two days after the time-management workshop. During this session, the subjects received a list of 17 behavioral goals, adapted from the workshop's learning points, to be performed in the weeks ahead. These subjects were also given an activities checklist to fill out three times per week consisting of 17 items corresponding to the behavioral goals. Examples of items are "I blocked out internal prime time for my most important project" and "I planned my day using a daily planner and referred to it several times." Subjects were told how the checklist could serve as a reminder of the goals to be achieved and were instructed on the proper method of completing it. At the end of four weeks, they returned their completed checklists to the researchers, who then prepared individualized written feedback regarding those behaviors performed well and those behaviors needing improvement. This feedback enumerated the number of times that a subject exhibited each of the 17 behavioral items and summarized this count in terms of the workshop's learning points. For example, a subject might have been informed that the checklist count indicated an application of learning points numbers 1 through 6, but not numbers 7 through 10. Subjects received these written comments during a one-hour group feedback session, at which time they were encouraged to exhibit those behaviors not previously checked and to continue to display those behaviors exhibited in the past.

The 65 subjects (41 women, 24 men) in the participative goal-setting condition likewise met for one-and-a-half hours two days after the workshop. Subjects were first asked to rank-order the ten learning points in order of importance to their own work settings. They were then asked to consider their highest-ranked learning point and to reduce it, in collaboration with the trainer, to one or more specific behavioral goals to be achieved in the coming weeks. For example, a subject may have taken workshop learning point number 3, "use a daily planner and construct a daily to-do list" and, working with the trainer, derived a specific behavioral goal, "each evening before

³ Time-nut refers to an individual who is preoccupied with time, devises impossible schedules, and is overly concerned with never wasting a minute.

⁴ See Lakein (1973) for a detailed treatment of these and other time-management training ideas and techniques employed in this program.

going to bed, I will quickly review my daily planner and then on one sheet of paper make a to-do list for the next day. I will keep this paper in my purse so I can check it throughout the day." This collaborative procedure was subsequently repeated for remaining learning points. At the end of this transfer session, subjects received forms on which to record all of their goals. This form also designated days on which subjects were to rate their own adequacy of performance on each goal, using a 5-point scale ranging from "I did not perform this goal adequately" to "I performed this goal very well." At the end of four weeks, the subjects returned their completed forms and attended a one-hour group feedback session, at which they received individualized written feedback similar, but not identical, to that given to the assigned goal-setting group. Specifically, each subject got a compilation of self-ratings on each of their goals as well as an overall comment summarizing these ratings in terms of the workshop's learning points. An overall comment might state, for example, that a subject's self-ratings indicated an application of certain learning points, but not others. There was also a general discussion encouraging the subjects to continue to engage in their goal-directed behaviors and to generate new activities that might help them better achieve their participatively set goals.

The 63 subjects (31 women, 32 men) in the relapse-prevention condition attended a two-and-a-half hour session two days after the workshop. Lectures and individual and group exercises exposed subjects to a set of self-control strategies intended to facilitate the continued application of their time-management skills by teaching them to understand and cope with the general problem of relapse. Specifically, subjects were made aware of the relapse process itself and asked to pinpoint situations that would likely sabotage their attempts to maintain their new learning for each of the workshops' ten learning points. They then developed lists of potential coping responses for these situations and were told that temporary difficulties or slips are predictable outcomes of any trial-and-error learning paradigm. Each subject left the session with a self-generated list of coping responses corresponding to each of the learning points. For example, one subject identified frequent impromptu TV-and-popcorn parties on her dormitory floor as a high-risk situation that could easily induce relapse to poor time-management habits. Some of the coping responses generated to deal with this projected situation included scheduling evening study time outside the dormitory, organizing early study sessions to free up later time for TV, and deciding which shows were favorites and blocking out relaxation time for them. The subjects were encouraged to try their coping strategies in the coming weeks and, if needed, to revise and add new coping responses to avoid the problem of relapse.

The 68 subjects (38 women, 30 men) in the control condition did not participate in any transfer session after attending the time-management workshop. All subjects, including those in the control condition, were asked to return eight weeks after the workshop for a final data collection session.

In summary, the assigned goal-setting condition involved a review of the workshop's learning points, assignment of specific goals via the behavioral checklist, use of a thrice-weekly record of goal accomplishments, and a group follow-up session with the trainer. The participative goal-setting condition consisted of a review of the workshop's learning points, the joint development of goals by trainer and trainee, use of a self-rated record of goal accomplishments, and a group follow-up session with the trainer. The relapse-prevention condition involved a review of the workshop's learning points, instructions in the nature of the relapse process, trainees' pinpointing situations that would sabotage learning, and development of self-generated lists of coping responses.

Dependent Measures

The effectiveness of the time-management workshop and the transfer strategies was evaluated in terms of reaction, learning, and behavioral change. We collected measures of reactions at three points: (1) after the workshop (time 1), (2) after the transfer sessions (time 2), and (3) after the eight-week study period (time 3). We obtained reactions to the workshop with ten items, five 5-point bipolar adjective scales and five Likert-type items, and essentially used the same ten items to assess subjects' reactions to their transfer sessions. Finally, we measured reactions to the training experience as a whole with 12 Likert-type statements.

In an effort to maximize this measure's content validity, we assessed learning via 16 short-answer questions derived directly from the workshop's learning points. We measured learning at times 1 and 3. Three graduate assistants working independently and using a scoring key graded the 16 questions as correct or incorrect. Agreement among these three scorers was approximately 95 percent.

Behavioral measures were collected from two sources. First, at time 3, subjects completed a self-report behavioral instrument; it consisted of 30 statements rated on a 5-point frequency scale ranging from always to never and requiring two responses from subjects, labeled post and then. The post response asked subjects how frequently they had exhibited each behavior during the two months since the workshop. The then response asked subjects how frequently they had exhibited each behavior prior to participating in the workshop. We took the discrepancy between the post and then responses, hereafter denoted as post/then, as an estimate of the amount of behavioral change appraised by the subjects themselves (Howard, Ralph, Gulanick, Maxwell, Nance, & Gerber, 1979). This post/then approach was adopted instead of a traditional approach using premeasures in order to minimize the potential confound of pretest sensitization of subjects (Cook & Campbell, 1979). In addition, we were confident that the random assignment of 256 subjects to the four conditions would make subjects comparable across conditions. Second, subjects were each asked to identify and select one person, an observer, who they felt could observe their management of time

during the eight-week study period. Observers completed a 10-item behavioral instrument at time 3, using the same frequency scale and post/then response format that was used with the self-report instrument. The ten items used in this second measure were somewhat broader in nature than those used on the self-report instrument. The Appendix contains details of all measures.

Data Analysis Procedures

To examine differences across the four experimental conditions, one-way analyses of variance were conducted on the reaction measures at times 1, 2, and 3; on the learning measures at times 1 and 3; and on the self- and observer-reported behavioral measures at time 3. We further investigated significant main effects with planned, orthogonal, multiple comparisons.

RESULTS

Table 1 presents means, standard deviations, and alpha coefficients for all measures collected. Table 2 shows intercorrelations among the measures. The medians of the intercorrelations between the three types of measures were reaction with learning (.07), reaction with behavioral (.04), and learning with behavioral (.06). It is evident that no correlation between dependent measures is large enough to cause concern about interdependence. The highest correlation in Table 2, .58, is between the time 3 behavioral self-report measure and the time 3 reaction measure. Although this relationship may be somewhat inflated because these two measures involved self-reports taken at approximately the same time, it seems reasonable that trainees who felt they had best applied their time-management skills would also react most favorably to their training experience.

ANOVAs were performed on each of the dependent measures taken at times 1, 2, and 3. For time 1, no significant differences between means for conditions emerged for either the reaction or learning measures. Similarly, reaction measures taken at time 2 revealed no significant differences across transfer conditions. Analyses of variance performed on the measures collected at time 3 did, however, indicate significant differences across conditions with regard to learning ($F = 4.25, p < .01$) and the post/then behavioral self-report measure ($F = 3.39, p < .02$); no significant effects were found for either the reaction or behavioral observer-reported measures.

Planned, orthogonal, multiple comparisons performed on the means of the significant main effects revealed that the subjects in the assigned goal-setting condition scored significantly higher on the learning measure at time 3 than did subjects in the participative goal-setting ($t = 2.39, p < .02$), relapse-prevention ($t = 3.05, p < .003$), and control conditions ($t = 3.15, p < .002$). Further, learning did not differ significantly across subjects in these last three conditions. With regard to the behavioral self-report measure, the multiple comparisons revealed that the assigned goal-setting and participative goal-setting conditions did not significantly differ from one another, but that each of these two transfer conditions brought about significantly more behav-

TABLE 1
Means, Standard Deviations, and Reliabilities for All Variables

Variables ^a	Number of Items	Reliabilities of Scales ^b	Experimental Conditions					
			Assigned		Participative		Relapse Prevention	
			Means	s.d.	Means	s.d.	Means	s.d.
Reaction, time 1	10	.72	4.14	0.23	4.12	0.30	4.08	0.37
Reaction, time 2	10	.68	3.92	0.37	3.83	0.34	4.00	0.36
Reaction, time 3	12	.87	2.41	0.50	2.47	0.64	2.52	0.49
Learning, ^c time 1	16	.56	3.45	1.86	4.37	2.21	3.93	2.17
Learning, time 3	16	.57	4.87	2.30	6.41	2.37	6.11	2.39
Behavioral, ^d self-report, time 3	30	.92	0.76	0.49	0.77	0.64	0.57	0.42
Behavioral, observer-report, time 3	30	.90	0.65	0.57	0.60	0.71	0.55	0.54
							4.08	0.45
							—	—
							2.42	0.53
							4.13	2.43
							6.56	3.10
							0.53	0.43
							0.69	0.50

^a Time 1 = immediately after the time-management workshop; time 2 = following the transfer session; time 3 = at the end of the eight-week study period.

^b Reliabilities calculated using Cronbach's alpha formula.

^c The learning measure was scored in terms of the number of incorrect responses, so lower scores indicate greater retention of learning.

^d Behavioral measures were calculated using post/then formula.

TABLE 2
Intercorrelations among Measures^a

Variables	1	2	3	4	5	6
1. Reaction, time 1	—					
2. Reaction, time 2 ^b	.50					
3. Reaction, time 3	-.08	.12				
4. Learning, time 1	.11	.06	.00			
5. Learning, time 3	.02	.09	.15	.37		
6. Behavioral, self-report, time 3	.02	-.05	.58	.08	.20	
7. Behavioral, observer-report, time 3	-.03	.00	.32	.10	-.03	.36

^a $N = 256$

^b The number of subjects for this measure was only 188, since the control group did not participate in any transfer session.

ioral change than either the relapse-prevention ($t = 2.15, p < .03$) or control ($t = 2.35, p < .02$) conditions.

DISCUSSION

Our major finding was that certain posttraining transfer strategies can, in fact, facilitate maintenance of learning and behavioral change. Compared to the control condition, two of the three experimental conditions—assigned and participative goal setting—brought about significantly greater levels of self-reported maintenance of behavior measured two months after training. These results provide support for recent contentions that various posttraining strategies can enhance positive transfer of training.

The positive self-reported results found for the assigned and participative goal-setting conditions are noteworthy, because they provide initial evidence that an approach previously found to be quite useful in increasing employees' motivation (Locke & Latham, 1984) also has applicability for facilitating positive transfer of training. Salancik's (1977) notion of behavioral commitment may explain the effectiveness of goal setting in this particular situation. Behavioral commitment implies that commitment to a task actually follows behavior rather than precedes it. The more explicit, public, volitional, and irrevocable a task-related behavior, the greater will be an individual's resulting commitment to the task. During the transfer session following the workshop, subjects in the assigned goal-setting condition were given the behavioral checklist, asked to individually review it, and then to discuss their personal activities planned for accomplishing these behavioral goals in the weeks ahead with their fellow group members. In addition, subjects agreed to maintain a thrice-weekly record of their goal accomplishments, to return their documents to the researchers for review, and to attend a later group session to discuss their accomplishments publicly.

During the participative goal-setting transfer session, subjects were first encouraged to generate their own behavioral goals and then, as in the assigned condition, to discuss their intentions and activities for attaining their personal objectives with other group members. Moreover, these subjects agreed

to rate their own goal accomplishments, return these forms to the researchers for review, and attend a later group session. It seems likely that subjects' public statement of intentions combined with external monitoring by the researchers fostered behavioral commitment and thus facilitated these subjects' positive transfer of training.

It seems plausible that those subjects exposed to the relapse-prevention treatment did not develop the same degree of behavioral commitment as did those subjects in the assigned and participative conditions. The relapse-prevention subjects were asked to brainstorm, first individually and then as a group, several high-risk situations that they believed might sabotage their newly acquired time-management skills. Using a procedure consistent with Marx (1982), we then had subjects develop their own exhaustive lists of alternative coping strategies they might use in their anticipated high-risk situations. However, the trainer did not ask individuals to explicitly state or document which particular coping strategy they would definitely use when faced with a particular situation. This allowed subjects some latitude in choosing a coping strategy each time they faced a particular high-risk situation. However, this lack of explicitness may have served only to reduce subjects' commitment to the specific behaviors. Furthermore, the monitoring of time-management behavior during the course of the study was left to the relapse-prevention subjects themselves, since this condition was derived from a behavioral self-management perspective. Here again, this practice made subjects' behavior less public and, therefore, may have reduced their commitment to the time-management skills. Perhaps monitoring over a longer term and feedback from those providing instruction could enhance the effectiveness of this approach. Interestingly, advocates of relapse-prevention training have already begun to suggest the inclusion of these elements in their interventions (Marx, 1985). In addition, some empirical support for such modification has recently appeared (Perri et al., 1984).

One final point regarding Salancik's (1977) notion of behavioral commitment is that his volitional component, taken by itself, suggests that the participative goal-setting condition should have been more effective than the assigned goal-setting condition, since subjects in the first condition had more input in the formation of goals. This was not the case in this study, suggesting a need for additional research on the complex dynamics of the components of behavioral commitment and how they relate to positive transfer of learning.

An interesting finding is that the assigned goal-setting treatment had a significant positive effect on both subjects' learning and behavioral maintenance, but the participative goal-setting treatment affected only behavior. Apparently, subjects in the assigned goal-setting condition were better able to recall specific, factual content from the workshop. Postexperimental interviews with these subjects suggested that the periodic act of completing certain items on their behavioral checklists (e.g., "I used the swiss cheese method to begin a major project") focused their attention on this factual content during the eight-week study period. Thus, these subjects scored well on the

learning measure. Our interviews also suggested that subjects in the participative goal-setting condition exhibited effective time-management behaviors without necessarily remembering specific factual information from the workshop that the learning measure asked for. For instance, one subject related that his participation in the workshop had helped him to reduce his previous procrastination in studying behavior, yet he admitted that he was unable to remember the swiss cheese method. He therefore got the item regarding the swiss cheese method wrong on the learning measure although he had essentially used this method to help himself reduce procrastination.

The comparability of the three treatment conditions was carefully controlled in this study in several ways, in that the workshop's content, the transfer trainer, the time of exposure to the transfer trainer, and the temporal proximity of the transfer session to the time-management workshop were the same for all three conditions. However, some differences in the transfer strategies themselves warrant discussion with regard to our findings. Each of the three treatment conditions was multidimensional, and, in fact, not all dimensions were under complete experimental control. For example, trainees in the group using the assigned goal-setting transfer strategy were instructed in the use of a checklist that provided them with information covering the complete range of the training workshop's content. At the other extreme, trainees in the relapse-prevention condition were involved primarily in a discussion of their potential slips and future coping strategies, which may have focused their attention on a narrow range of the workshop's content. Although trainees in the participative goal-setting condition ranked all ten learning points covered during the time-management workshop, their individually tailored goals were not as tied to the full range of training content as were the standardized goals given to the trainees in the assigned goal-setting condition. In short, the three transfer strategies probably differed somewhat in their coverage of the workshop's content; this, in turn, may have influenced our findings on learning.

In addition, the three conditions differed in how the content of the two-and-a-half hour transfer strategy sessions was distributed over time. Subjects in each of the goal-setting conditions returned after four weeks for a one-hour group feedback session, but those in the relapse-prevention condition did not. Proponents of goal-setting strategies have advocated such group feedback sessions as a means of providing the extrinsic feedback that effective goal setting requires (Erez, 1977). On the other hand, proponents of the relapse-prevention strategy emphasize individual control via self-monitoring and intrinsic feedback. Thus, in accordance with the relapse-prevention model outlined by Marx (1982), we used no group feedback session. Thus, it might be argued that the superiority of the goal-setting conditions with respect to self-reported behavioral change may have been partly due to the study's demand characteristics (Orne, 1962). Perhaps their attendance at the group feedback sessions exposed subjects in the goal-setting conditions to higher experimental demand. It is possible that the feedback session and the four weeks between the workshop and that session could be construed as training

time, even in the absence of the trainer. Although we cannot entirely rule out the possibility of differences in the effects of demand characteristics on our behavioral findings, several considerations cast doubt on its likelihood. First, even though the two-and-a-half hours were distributed differently across conditions, the total time that trainees spent with the trainer was identical. Second, subjects were instructed from the outset that they would receive course credit simply for their participation in the training project, regardless of any reported improvements in their time-management skills. Third, we found no significant differences in trainees' reactions across the three transfer strategies at either time 2 or time 3, which suggests that differential demand did not significantly influence those self-report measures.

One issue of possible concern is that the significant behavioral findings of this research were self-reported. It has been demonstrated that experimental interventions that employ traditional self-report measures of before and after ratings are particularly subject to response-shift bias or beta change; experimental intervention somehow changes subjects' evaluative standards for the dimension measured (Terborg, Howard, & Maxwell, 1980). It has been shown, however, that a post/then measurement, this study's approach, provides conclusions more similar to objective ratings of changes in behavior than do results obtained with traditional pre/post self-report methods (Howard et al., 1979). Further, although there is some evidence that self-ratings can be inflated (Beatty, Schneier, & Beatty, 1977; Thornton, 1980), this tendency is of little concern in this study comparing behavioral measures across experimental conditions.

Unlike the self-report measure, the observer-reported measure of maintenance of behavior revealed no significant differences across conditions. This finding is consistent with the low ($r = .36$) correlation between these two measures. Although it is possible that behavior actually did not change, postexperimental discussions with subjects suggest two other very plausible reasons for this relatively low correlation and the nonsignificant finding with the observer-reported measure. First, most of the subjects reported that they chose a roommate as their observer. Unfortunately, these individuals may have had little opportunity to observe their roommates' time-management behaviors, which could be manifested in places, like the library, or at times, like early morning, when observers were not present. Second, the observers, who were asked to complete the behavioral measures at the end of the study, had to recollect observations made during the previous eight weeks. If these observers had been required to submit their observations periodically throughout the study period, perhaps the observer-reported measure would have more closely reflected the self-reported findings.

This study suggests that using certain posttraining transfer strategies can enhance the effectiveness of training and development programs. As a beginning in understanding the enhancement of positive transfer, it also suggests several directions for future research. First, it certainly is important to go beyond these findings to specify more precisely what influences positive transfer. Research is now needed to investigate the relative effects of goal

setting per se, the comprehensiveness of transfer strategies, the nature and timing of feedback given to trainees, and the presence of demand characteristics in training situations. Future studies are needed to tease out the relative importance of each of these variables only globally examined in this initial study. Second, there is clearly a need to replicate our findings in other training contexts and with other types of training content. Specifically, researchers need to see if these results hold up using managers as subjects; other types of training workshops, such as communications, stress management, or assertiveness workshops; and longer time periods. Third, research should ascertain if combining posttraining strategies can enhance transfer better than a single strategy. For example, it would be interesting to examine the combined effects of assigned or participative goal setting with relapse prevention. In a similar vein, it might be fruitful, as Leifer and Newstrom (1980) suggested, to go beyond the investigation of posttraining strategies and examine the effects of combining strategies from before, during, and after training. Finally, future studies need to focus attention on finding ways to measure actual behavioral change. Improving the rating ability of observers, one potential way of enhancing such measurements, might be achieved by cueing observers to recognize appropriate behaviors and teaching them how to observe change. The creative use of unobtrusive measures may be another way to measure behavioral change. For instance, in the case of time-management trainees, it may be advisable to gather their personal daily planners. Further, although it is often difficult, we strongly encourage the use of outcome or results measures in addition to behavioral measures.

From a practical viewpoint, these findings suggest that trainers concerned with maximizing positive transfer of learning might consider augmenting their training programs with a posttraining transfer strategy. Although additional research is needed before a definitive statement can be made, this study points to the potential usefulness of goal setting as a means of facilitating positive transfer in posttraining environment.

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APPENDIX

Reactions to the workshop were obtained by means of five 5-point bipolar adjective scales (chaotic-organized, unstimulating-stimulating, irrelevant-relevant, unapplicable-applicable, impractical-practical) and five items using a 5-point response format ranging from 1, strongly agree, to 5, strongly disagree: (1) I learned a lot from this time management program; (2) I am now much more aware of the importance of managing my time; (3) I feel more competent in the use of time management techniques; (4) I think I will use the techniques and strategies I have learned to improve my time management; and (5) I would recommend this program to other students.

Reactions to the transfer sessions included the same five bipolar adjective scales together with the following five items: (1) I learned a lot from this transfer of training session that will help me actually apply the time management techniques I learned in the Monday session; (2) This transfer session made me more aware of the necessity of having a strategy for applying behaviors even after they have been adequately learned; (3) I think this method of applying time management training makes sense and is well worth spending the additional time on; (4) I saw no additional value in this transfer session beyond the Monday session; (5) I plan to use this transfer technique to help me better apply the skills, strategies, and techniques I learned in the seminar on Monday. Item 4 was reverse scored.

Reactions to the training experience as a whole were measured using 12 Likert-type items, as follows: (1) I think the training program was very successful in improving my ability to manage my time; (2) I felt like I used some of the material presented; (3) I felt like I had better control of my time this term; (4) The training succeeded in teaching me how to effectively prioritize and schedule; (5) I was more relaxed, less rushed this term; (6) I felt I moved closer to my goals this term; (7) I feel competent in the use of time management techniques; (8) I think the training contributed to my better performance in school this term; (9) For the most part, I forgot about the time management training; (10) I was at least more conscious of my time management behavior

this term; (11) I enjoyed my participation in the training; (12) I would recommend the sessions I participated in to other students. Response formats were on 5-point scales ranging from 1, strongly agree, to 5, strongly disagree. Item 9 was reverse scored.

Learning was assessed via the following 16 short-answer questions that were graded as correct or incorrect: (1) What is the first step in establishing long term goals; (2) After you have established your goals, how do you use them to help you improve your time management; (3) How often, and during what part of the day, should you make up your to-do list or planner; (4) How many sheets of paper should you list your activities on; (5) When should C's be attempted in the ABC priority method; (6) Assuming you have prioritized your day using the ABC method, what should you do in that spare ten minutes before lunch; (7) What is the "swiss cheese method" discussed in the film; (8) Identify one idea presented in the program that will help you avoid procrastination; (9) Identify one idea presented in the program that will help you deal more effectively with interruptions; (10) What is a C-Drawer; (11) What is the 80/20 rule in time management; (12) What is the difference between internal and external prime time; (13) When is the best time (internal or external) to block out for important projects; (14) What is meant by a "productive" break period; (15) What is one question you might ask yourself to determine if something is a time waster, or something better left undone; (16) What is Lakein's rule (the number one rule of time management)? Hint: It is actually a question, he says you should ask yourself frequently each day.

The self-reported behavioral instrument had 30 items using a 5-point response format ranging from 1, always, to 5, never: (1) I review or revise my long term goals; (2) I link my daily activities to my goals and not just to urgency or time pressure; (3) I spend most of my time on high priorities; (4) I make up a daily planner or to-do list; (5) I set deadlines to help avoid procrastination; (6) I try to make my deadlines "public" by telling my roommate or others about them; (7) I put low priority activities (C's) in a special drawer or place; (8) I let interruptions break up my work time; (9) I take breaks that are "productive" and get me away from work tasks; (10) I spend excess time trying to decide what to do next; (11) I brainstorm about whether my goals are really what I want from life; (12) My activities are controlled by others' expectations and demands; (13) My days are basically just handling each activity or crisis as it comes to my attention; (14) I tried to get started earlier on my major projects by "poking holes" (working on small parts of them); (15) I blocked out internal prime time for important tasks on projects; (16) I concentrated on "doing it now"; (17) I actively tried to recognize my time wasters by asking "what would happen if I just didn't do this"; (18) I practiced tactful assertiveness; (19) I have days where I felt I get absolutely nothing accomplished; (20) I rewarded myself for not procrastinating; (21) I thought about what was my internal prime time and tried to distinguish it from external prime time; (22) I planned something enjoyable each day; (23) I was able to spend time doing things I really wanted to do; (24) I found myself overscheduling; (25) I asked Lakein's question daily: "what is the best use of my time right now"; (26) I kept my to-do list on one sheet and made it up at a designated time each day; (27) I tried to very moderately change my behavior (by blocking out very small time chunks) to help me get more done; (28) I really try to prioritize my to-do list; (29) I complete my to-do list; (30) When I found myself not working on high priority tasks I either changed my behavior or modified my priorities on the to-do list. Items 8, 10, 12, 13, 19, 24, and 29 were reverse scored.

The observer-reported behavioral instrument had 10 items using the same 5-point frequency scale: (1) The person seemed very goal oriented; (2) The person seemed very conscious of planning and prioritizing their day; (3) The person seemed to successfully avoid major procrastination; (4) The person blocked out time for studying; (5) The person seemed to waste little time in indecision; (6) The person was good at not allowing interruptions to disrupt their schedule; (7) The person was rushed or behind; (8) The person was substantially overloaded and had to work long hours or pull "all nighters" to catch up; (9) The person uses a term calendar and/or daily time planner; (10) The person overscheduled. Items 7, 8, and 10 were reverse scored.

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EXPLAINING THE BIASING EFFECTS OF PERFORMANCE CUES IN TERMS OF COGNITIVE CATEGORIZATION

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Previous research has consistently demonstrated that observers' ratings of various phenomena related to group processes are significantly biased when raters get bogus feedback about a group's performance before the rating task. This study strengthens Phillips and Lord's (1982) explanation of this bias and tests McElroy and Downey's (1982) alternative explanation. Results indicate that ratings of both specific observable behaviors and global evaluations are biased in the direction of performance cues. A rated behavior's relation to observers' conceptions of good and poor leadership explains such bias better than observability.

Observers' memory-based ratings of organizational phenomena provide the data for much research and many decisions; some examples include studies of leaders' behaviors, performance appraisals, and selection interviews. Therefore, any bias in observers' judgments threatens the quality of both data and decisions. One such bias occurs when group members rate aspects of their group's functioning, such as processes of interactions, members' characteristics, or leader's behavior, with concomitant knowledge of the group's performance (Binning & Lord, 1980; DeNisi & Pritchard, 1978; Downey, Chacko, & McElroy, 1979; Larson, 1982; McElroy & Downey, 1982; Staw, 1975). Studies have consistently found that group members who get bogus feedback indicating that their group performed a designated task poorly rate their group's processes significantly more unfavorably than do their counterparts who receive bogus feedback indicating good performance. Attempts to understand this feedback-induced bias have either focused on identifying those conditions in which it is most likely to operate (Binning & Lord, 1980) or on specifying the cognitive processes underlying such bias. The present study attempts to further articulate these underlying cognitive processes.

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COGNITIVELY PROCESSING SOCIAL INFORMATION

One of the most widely accepted principles of human cognitive functioning is that the quantity and variety of stimuli encountered in daily activities typically exceed people's capacity for paying attention and remembering. Therefore, in order to operate in complex social environments, they must be somewhat selective in what they observe, attend to, store in memory, and retrieve. This need for selectivity has led many theorists to posit that judgments based on memory stem directly from processes of simplifying information that observers use during normal information processing. One such process, advanced by Lord (1981) and by Feldman (1981), involves simplifying perceptions of complex social stimuli by grouping or classifying people and their behaviors into already existing, contextually meaningful categories. Many consider this categorization process to underly the basic process of perception. People endow stimuli with meanings by way of their relations to other stimuli, both similar and different (Bruner, 1958; Ilgen & Feldman, 1983). By grouping newly encountered others and their behaviors together on the basis of some important similarity to past experience, people can think about and respond to them in ways they have already mastered. Furthermore, they can then better identify and assign meaning to the behavior of others, infer unobserved attributes, make predictions about the future, and understand causes of events.

A simple characterization of this process suggests that, upon observing or interacting with others, individuals tend automatically to categorize them into groups or types on the basis of cues like salient behavior, aspects of the situation, physical appearance, role constructs, and so forth (Cantor & Mischel, 1979). These categories, in effect, become cognitive pigeon-holes that reduce the number of social entities needed to make judgments and comparisons. As such, each category can be conceived of as a relatively unique configuration of characteristics. Moreover, each category possesses an average or most representative member, frequently referred to as a prototype. Prototypes are cognitive structures, representing the personal characteristics and behaviors of typical members of categories, in the form of an "abstract analog, or image, summarizing 'central tendencies' or resemblances among category members" (Ilgen & Feldman, 1983: 152).¹

To the extent that people tend to process certain types of social information in this way, some important consequences for understanding ratings of behavior arise. First, raters' existing category systems may influence the way they process incoming information from another's behavior. For example, a person who arrives for a job interview in jeans and a flannel shirt is likely to

¹ The concept of prototype is not fundamentally different from that of stereotype. Certainly, no clearcut distinction between the two exists in the social cognition literature. However, the term prototype is generally used in discussions of category-based processing of social behavior. Stereotype, along with its pejorative implications, is generally used when discussing culturally shared notions of racial, ethnic or occupational groups of people (Holyoak & Gordon, 1984; Ilgen & Feldman, 1983).

be categorized differently than one who wears a suit. It is also likely that the person's mispronouncing a word during the interview will take on different meanings in these two contexts. Second, once they have categorized someone, people tend to forget specifics about that individual; rather, when asked to remember—as when rating a group member's past behavior—they evoke seemingly relevant category prototypes and generate or reconstruct responses consistent with these prototypes. To further develop the interview example, in discussions about hirability two weeks after the interview, one person's flannel shirt and jeans may make it more likely that someone will bring up that person's "poor communication skills."

These judgments of prototypicality result from the use of the representativeness heuristic (Tversky & Kahneman, 1982), a strategy for simplifying information on which people seem to rely in a variety of inferential tasks (Nisbett & Ross, 1980). For instance, Cooper (1981) attributed halo error in performance appraisal ratings in part to the operation of this simple judgmental strategy. In their discussion of the way people use judgmental heuristics to simplify everyday decision making, Tversky and Kahneman presented considerable support for the notion that people rather automatically judge the likelihood that an event or behavior fits into a given category by how similar that event is to the category prototype. They argued that the representativeness heuristic underlies at least three other types of judgments; these are (1) assessing the specific value of a variable in a defined distribution, (2) deciding whether a sample derives from a given population, and (3) deciding whether a specific effect results from a particular cause. Therefore, judgments about prototypicality can be considered special instances in which the representativeness heuristic is used to simplify social judgment.

EXPLAINING EFFECTS OF PERFORMANCE CUES

This categorization process provides an explanation for the effects of performance cues. While interacting in or observing a group, potential raters process a subset of members' behaviors into existing category systems that can be idiosyncratic to each observer. Raters also process knowledge about performance. It seems reasonable to assume that being told that an observed group's performance was quite good (or poor) is a salient piece of information; its salience is due in part to the universal emphasis placed on the importance of performance, especially in problem solving groups. Presumably, all individuals process this information and store it as part of their base of group knowledge. When they provide ratings, their category-based recall differs depending upon whether they engaged a good-performance category or a poor-performance category. Behaviors associated with groups that perform well are likely to differ from behaviors associated with those that perform poorly. Since details of specific behaviors are likely to have been lost in the categorization process (Wyer & Srull, 1980), ratings generated from category prototypes of good groups will differ from those of poor groups.

Phillips and Lord (1982) illustrated how knowledge of performance operates to bias ratings of observed behavior. Their student observers received

bogus feedback about a group's performance. They were then asked to describe the leader's behavior using a specially constructed leadership questionnaire containing descriptions of (1) behaviors highly characteristic of effective leadership, (2) behaviors highly characteristic of ineffective leadership, and (3) neutral behaviors, equally characteristic of effective and ineffective leadership. Moreover, the leader actually exhibited only a subset of the behaviors of each type described on the questionnaire. Phillips and Lord found that the bogus information about performance significantly affected ratings of effective and ineffective behaviors, but had little effect on neutral items. Their findings suggest that observers given good performance feedback engage a good leader category to generate responses, judging effective behaviors to have occurred more often than ineffective behaviors, and they do the opposite given poor performance feedback. Interestingly, subjects could distinguish the presence or absence of neutral behaviors better than they could perceive effective and ineffective behaviors.

Phillips and Lord's (1982) study strongly suggests that observers' naturally occurring processes of categorization interact with the type of behavior being rated, systematically distorting behavioral descriptions to fit the prototype of the category that bogus performance feedback implies. However, the authors pointed out an alternative interpretation of these differential performance-cue effects. Some form of nonequivalence of the items other than prototypicality may exist. Even though they argued convincingly that the items were constructed and selected in order to maintain equivalence, the possibility exists that their portrayal on the stimulus videotape made neutral items more salient or observable than prototypic items. In a similar vein, McElroy and Downey (1982) found differential performance-cue effects across their dependent measures. After finding no evidence that levels of raters' group involvement explained this bias, they suggested type of item as an explanation. They also suggested that perceptions of clearly observable behaviors may be less susceptible than global evaluations to this biasing effect.

In light of these issues, the purpose of the present study was twofold. First, we designed it to replicate substantively Phillips and Lord's study in order to strengthen the evidence that prototypes mediate the effects of performance cues. Second, in order to test the question McElroy and Downey raised, we included both specific behaviors and global evaluations as dependent measures.

STUDY DESIGN

Subjects observed a videotape of a problem-solving group with four members and were then asked to complete a 37-item questionnaire describing the group leader's behavior, immediately after they had received bogus feedback on the group's performance. The first 30 items were identical to those Phillips and Lord (1982) used. We hypothesized that if subjects' ratings of the extent to which certain leadership behaviors occurred stem from

recall based on categories, the following pattern of results should emerge. Subjects receiving bogus good feedback will generate ratings based on a good-leader prototype and thus will rate effective behaviors as more likely to have occurred than ineffective ones. Those receiving bogus poor feedback will do the opposite. The performance manipulation will have less effect on neutral items, behaviors prototypic of neither good nor poor leadership. Another indication of this category-based processing should be that subjects will be less able to perceive effective and ineffective behaviors—those central to leadership prototypes—than to perceive neutral behaviors.

The study was designed to allow a test of an additional issue. McElroy and Downey (1982) noted that feedback concerning performance did not affect certain of their dependent variables and suggested that, "if asked for perceptions of observable events or behaviors, the responses may be performance-attribution free. Whereas, research results must be viewed much more tentatively, however, if respondents are asked to make judgments or evaluations" (1982: 833). To test this notion, we asked subjects to provide global evaluations of a leader's behavior. Effects of performance cues on these items were compared to those on specific behaviors in order to determine if differences in the type of judgment can account for feedback-induced bias.

The data reported here were collected during a larger investigation concerned with the different effects of automatic and controlled categorization processes on ratings of behavior (Binning, Bieschke, Knapp, & Zaba, 1985). In addition to manipulating information on performance, prototypicality of leader's behavior, and presence or absence of behaviors, we assigned subjects to five instructional conditions varying as to the degree of cognitive control they were to exert during observation. Finding no significant interaction between this factor and those central to this study, we collapsed the data across these processing conditions.

METHODS

Subjects, Design, and Stimuli

Subjects were 269 undergraduate students from Illinois State University who participated in psychology experiments in return for course credit. We randomly assigned mixed-gender groups of from five to ten subjects to one of two performance-feedback conditions.

A 15-minute color videotape of a four-person problem-solving group working on the truck route problem described in Binning and Lord (1980) served as the rating stimulus. The tape depicted two men and two women, graduate students in industrial/organizational psychology with whom subjects were unacquainted, sitting at a table with task materials. The leader sat at the far left end of the rectangular table, and members were arranged by alternating gender.

In order to maintain comparability with Phillips and Lord (1982), one of the men was chosen to be the group's designated leader. He was coached to

exhibit five clear instances of effective leadership behavior, five instances of ineffective behavior, and five instances of neutral behavior; these were evenly distributed across the videotape. The instances were examples of the more general behavior descriptions used by Phillips and Lord (see Table 1). However, we made no attempt to duplicate their videotape, basing scripts for behavioral incidents solely on descriptions of behavior that appear in their article.

Briefly, Phillips and Lord's methodology for identifying the types of behavior characteristic of leadership prototypes was as follows. Two groups of 20 subjects each rated the extent to which each of 53 behavioral descriptions fit their images of effective and ineffective leaders on 7-point Likert formats. A behavioral item was considered effective or ineffective if it received an average rating that was greater than or equal to 5.0 for effective or ineffective leaders, respectively. Moreover, the mean ratings for effective and ineffective had to differ by at least two scale points. In contrast, neutral behaviors were those for which the average ratings for both effectiveness and ineffectiveness were less than or equal to 5.0, and the averages differed by less than two scale points.

In the present study, the following steps were taken to insure that the behavioral incidents were accurately depicted on the videotape. First, prior to taping, the leader studied the list of 15 behaviors he was to exhibit. A 15-minute dress rehearsal followed. During the actual videotaping, the leader referred to a list of behaviors to be exhibited that rested on the table unobtrusively mixed with other papers. Since the task involved frequently referring to charts, this posed no threat to the realism of the tape. Finally, a graduate assistant coded the behaviors the leader actually exhibited on the tape, using the list of scripted behaviors. This coding corroborated the appearance of all 15 designated behaviors.

Procedures

Subjects reported in groups to the experimental room and were seated at desks facing a color videotape monitor on an elevated stand. Then the introductory instructions were read and the videotape shown.

After watching the videotape, subjects were handed the experimental questionnaire. The first page contained written instructions and bogus information about the group's performance. Subjects were led to believe that the group on the videotape had performed either second best or second worst of 24 groups performing this particular task. The questionnaire then contained the 30 items describing behaviors. Fifteen of these items described behaviors that were depicted on the videotape and 15 described behaviors absent from the videotape. Subjects were asked to indicate, on 7-point Likert format, whether the leader had exhibited each of the 30 behaviors. Anchors ranged from 1 = definitely did not occur to 7 = definitely did occur.

Next, using separate sheets of paper, subjects gave global evaluations of the leader's behavior on each of five leadership dimensions. An example of these items, anchored from 1 = poor to 7 = excellent, is "Overall, how would

TABLE 1
Mean Ratings^a of Specific Behaviors and Variance Explained
by Performance Cues

Specific Behavioral Items	Performance Cues		<i>F</i>	Eta ²
	Good	Poor		
Effective, present on tape				
He set specific goals for the group	6.07	4.71	62.54***	.18
He assigned specific tasks to the other group members	6.22	5.81	5.89*	.02
He told at least one other person that they had done well	5.44	4.77	6.07*	.02
He acted as arbitrator when others disagreed	4.27	3.67	6.83**	.02
He admitted having made a mistake	5.45	4.99	3.07	.01
Effective, absent from tape				
He let the other group members make decisions	4.73	4.34	4.40*	.01
He maintained definite standards of performance	5.40	4.21	42.79***	.14
He told the other group members that he trusted their judgment	3.41	2.78	9.07**	.03
He tried to get the group to work as a team	5.81	4.78	29.99***	.10
He delayed action on some matters	4.27	4.54	1.20	.00
Ineffective, present on tape				
He expressed confusion about the task	3.47	4.26	13.92***	.05
He told someone they had done poorly	5.17	5.80	7.54**	.03
He insisted on having his own way	4.74	4.96	1.12	.00
He made fun of another group member	4.42	4.78	1.53	.00
He did things without explaining his actions	4.07	4.46	2.80	.01
Ineffective, absent from tape				
He let the details of the task overwhelm him	3.68	4.31	8.14**	.03
He frequently changed his plans	3.29	4.18	17.44***	.06
He expressed anxiety about the group's performance	5.58	5.59	.01	.00
He expressed worry over the other group members' suggestions	4.86	4.88	.02	.00
He suggested several wrong solutions to the task	4.01	4.25	1.22	.00
Neutral, present on tape				
He suggested the correct solution to the task	4.83	4.23	8.34**	.03
He needled the other group members	5.19	5.45	1.36	.00
He asked the other group members to expend more effort	6.11	6.11	.00	.00
He stressed competition with other groups	2.81	2.92	.23	.00
He asked the other group members to work harder	6.39	6.42	.08	.00
Neutral, absent from tape				
He let everyone work at their own pace	2.53	2.28	2.28	.01
He accepted delays caused by the other group members	2.29	2.40	.28	.00
He designated himself as the spokesman for the group	5.30	5.64	2.31	.01
He told the other group members that he was nervous	1.96	1.80	.84	.00

TABLE 1 (continued)

Specific Behavioral Items	Performance Cues		F	Eta ²
	Good	Poor		
He mentioned being concerned about personal recognition	1.96	2.09	.58	.00

^a $df = 1,259$

* $p < .05$

** $p < .01$

*** $p < .001$

you rate the leader's attempts at *Initiating Structure*?" Then subjects rated the leader's overall performance with an item asking "How likely do you think it is that this leader would be a good leader in other situations?" anchored from 1 = very unlikely to 7 = very likely.

Finally, the questionnaire elicited some demographic information and concluded with an open-ended question about subjects' perceptions of the experimental hypotheses. Subjects were then debriefed and dismissed.

RESULTS

Ratings of the behavioral description and global evaluation items were subjected to a MANOVA in order to assess the effects of the performance manipulation. We found significant effects on both behavioral descriptions and global evaluations ($F = 4.37, p < .01$; $F = 17.47, p < .001$). To better assess these effects, we ran univariate ANOVAs on each item. Performance cues significantly affected 13 of the 30 behavioral description items, with two more items marginally significant ($p < .09$). Performance cues significantly influenced all 7 of the global evaluation items. The results of these analyses appear in Tables 1 and 2. Although these data indicate that performance cues affected ratings of specific behaviors as well as global evaluations, these effects substantially differed in strength for the two types of items. Specifically, average values for eta-squared across behavioral items and global evaluations were .03 (range = .00 to .18) and .13 (range = .03 to .28), respectively, indicating that information on performance had a stronger biasing effect on global evaluations. McElroy and Downey (1982) suggested this finding. However, two points stand out. First, for both ratings of specific behaviors and global evaluations, we found significant performance-cue effects. Second, although the average manipulation-induced bias for global evaluations was greater than that for specific behaviors, this bias varied substantially across global evaluations, with the ranges of values of eta-squared for these two types of judgments overlapping substantially. Close examination of Table 1 reveals that performance cues primarily affected items tapping behaviors prototypical of effective leadership. We conducted further analyses to assess better the nature of these different effects for performance cues.

To assess the combined effects of the performance manipulation with our other experimental manipulations, we performed a $2 \times 3 \times 2$ mixed analysis of variance with repeated measures on the last two factors. Factors were information on performance, prototypicality of behavior, and presence or absence of behavior. Descriptive data on subjects' ratings of behavioral items appear in Table 3, and results of the corresponding analysis of variance appear in Table 4. It is important to note that the data in Tables 3 and 4 represent analyses of composite scores derived by summing subjects' responses to each type of item (effective present/absent, ineffective present/absent, and neutral present/absent). Figure 1 presents these data graphically.

These data confirm our expectations and replicate Phillips and Lord's (1982) finding that performance cues primarily affect behaviors central to observers' notions of what constitutes effective or ineffective leadership. The significant interaction between performance cues and prototypicality ($F = 33.82, p < .001$), in combination with the pattern of ratings in Tables 1 and 3, indicates that performance cues most significantly biased ratings of effective

TABLE 2
Mean Ratings^a of Global Evaluations and Variance Explained
by Performance Cues

Global Evaluation Items	Performance Cues		F	Eta ²
	Good	Poor		
Initiating structure ^b	5.39	4.16	54.91**	.17
Consideration ^b	3.44	2.68	21.39**	.06
Persuasiveness ^b	5.08	4.60	7.37*	.03
Production emphasis ^b	6.10	5.18	35.84**	.12
Tolerance of freedom ^b	3.59	2.98	12.16**	.04
Rating of overall performance	4.65	2.95	113.21**	.28
Good leader in other situations?	4.29	2.88	63.07**	.18

^a $df = 1,258$

^b The stem for these items reads, "Overall, how would you rate the leader's attempts at . . ."

* $p < .01$

** $p < .001$

TABLE 3
Descriptive Statistics for Composite Behavioral Ratings

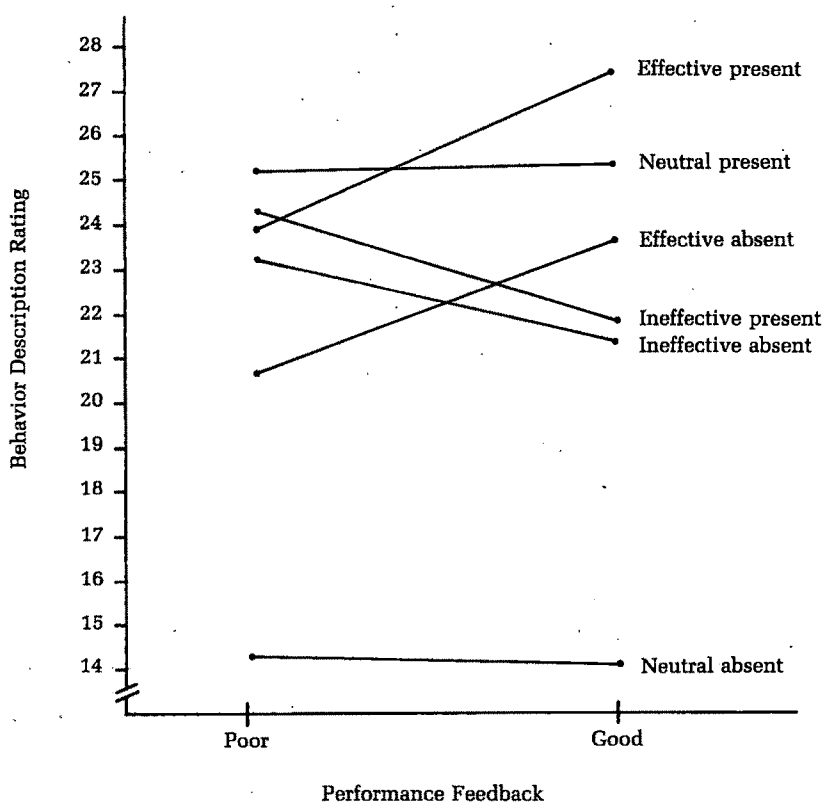
Prototypicality	Poor Performance Cues				Good Performance Cues			
	Present		Absent		Present		Absent	
	Means	s.d.	Means	s.d.	Means	s.d.	Means	s.d.
Effective	23.95	5.17	20.65	4.50	27.44	4.67	23.63	4.90
Ineffective	24.27	5.72	23.21	5.25	21.87	6.35	21.40	5.03
Neutral	25.13	4.12	14.21	3.89	25.32	4.41	14.04	4.32

TABLE 4
Results of Analysis of Variance of Composite Behavioral Ratings

Sources	df	MS	F
Performance cue (A)	1, 267	59.46	1.50
Prototypicality (B)	2, 534	2,557.29	88.98*
Presence/absence (C)	1, 267	10,657.33	512.02*
A × B	2, 534	972.12	33.82*
A × C	1, 267	0.90	0.04
B × C	2, 534	3,841.31	287.16*
A × B × C	2, 534	12.16	0.91

* $p < .001$

FIGURE 1
Performance-Induced Biases in Descriptions of Behavior



leadership behaviors, with ineffective behaviors affected to a lesser degree. Performance cues significantly affected only one of the eight neutral items, indicating their relative immunity to this bias.

Further evidence that prototypes mediate the effects of performance cues is the significant interaction of prototypicality and presence or absence of a behavior ($F = 287.16$, $p < .001$). Subjects were clearly able to differentiate between the presence and absence of neutral behaviors, but were less able to do so for effective behaviors, and even less able to do so for ineffective behaviors.

DISCUSSION

The present results further strengthen Phillips and Lord's (1982) explanation of performance-cue bias in terms of prototypes. This bias seems to operate on ratings of specific behaviors, group process variables, and global evaluations. However, some qualification of this conclusion is necessary. Ratings of behaviors particularly associated with effective or ineffective leadership are especially susceptible to the effects of performance cues because the categorization process simplifies stimuli. When asked to provide ratings, people engage a relevant category and generate or reconstruct responses consistent with the category's prototype. Therefore, the performance-cue bias operates strongly for ratings of behaviors closely associated with notions of good and poor leadership, but ratings of neutral behaviors not associated with these notions are relatively immune to this biasing effect. It should also be recognized that these results indicate that global evaluations are more susceptible to this bias than ratings of specific observable behaviors. This finding is consistent with the results of previous research, which indicated that the strength of the effects of performance cues covaries negatively with the amount of actual behavioral information available to raters. Lord, Binning, Rush, and Thomas (1978) found smaller, although statistically significant, performance-cue effects on those rating dimensions for which there was much relevant stimulus behavior. These effects were substantially larger in a study by Rush, Thomas, and Lord (1977), in which no actual behavior was observed. Perhaps the crucial issue is the degree of behavioral specificity. Gioia and Sims (1985) found that performance cues did not significantly affect ratings of their highly specific stimulus behaviors. This issue clearly requires more research.

What general conclusions can we draw from this and previous research on performance-induced rating biases? It is clear that effects of performance cues represent a reliable source of rating bias that is moderated by not only the type of behavior being rated but also by the amount of information relevant to ratings that is available. Clearly, if raters are forced to provide ratings for which they have no relevant information, they are more likely to construct or infer their responses from preconceptions about how pieces of salient information go together. An important point is that lack of exposure to relevant behavior is only one cause of such informational deficits. The simplifying tendency of processes of categorization may cause loss of informa-

tion as well. Logically, then, the more fully a rater cognitively processes another's behavior, the more likely that resultant ratings will accurately describe that behavior.

Evidence is emerging suggesting that people develop automatic ways of cognitively processing information in their environments (Hasher & Zacks, 1979; Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977). However, it is possible to exert control over such processing by consciously guiding attention, storage of information, and its retrieval from memory. The assumption is that increased processing effort can lead to more accurate encoding of behavior.

Lord and Smith (1983) detailed some factors that potentially explain differences in the cognitive effort people exert while encoding behavioral information. Among these are situational characteristics, such as whether observed behaviors are consistent with observers' expectations; situational norms dictating appropriate degrees of care to be taken during different judgmental tasks, such as selection interviews versus daily interactions; and available attentional capacity to be devoted to encoding behavioral information. A rater's motivation may also increase the degree of effort exerted; a rater who anticipates future interaction with a ratee may exert more effort than someone not anticipating such interaction. Similarly, an individual who depends on another for rewards probably engages in conscious efforts to understand that other individual and remember exhibited behaviors. Still another motivational factor is need for control; in situations in which individuals perceive a need to control their environments, they may make more effort to process available information. Finally, individual differences in information processing capabilities may affect the degree of cognitive control exerted while encoding behavioral information. Clearly, further research is required to delineate not only the most effective strategies for enhancing processes of control, but also the subsequent effects of this control on the accuracy of ratings of behavior.

Although the research paradigm discussed in this study involves the experimental manipulation of bogus feedback on group performance, several conceptual parallels in other areas of research present an intriguing possibility of generalizing these results. For instance, one goal of a research program by Dipboye and associates (Dipboye, Fontenelle, & Garner, 1984; Dipboye, Stramler, & Fontenelle, 1984) is to uncover the effects of information from applications and resumés on interviewers' behavior and their recall of information from selection interviews. These researchers have already found that in subsequent descriptions of candidates with poor credentials, interviewers recall less favorable information from interviews, perceive interviewees as exhibiting fewer favorable behaviors and traits, and rate question-answering performance as poorer, relative to candidates with good credentials. In a selection interview, it is likely that people receive a naturally occurring manipulation of feedback on performance that may or may not covary with performance in the interview and can therefore bias subsequent ratings. Of course, perhaps candidates with poor credentials are actually likely to per-

form poorly in interviews. However, even if this is probable, the strongest argument for using interviews in selection processes is to evaluate characteristics not as easily assessed by other procedures. To the extent that such characteristics are not correlated with resumé information, the effects of pre-interview impressions represent bias. Perhaps more important is the bias introduced when an average resumé is pitted against a good one. Binning and Lord (1980) showed that the degree of performance-cue bias increases linearly with increases in the amount (or strength) of feedback on performance. An interviewer may unfairly evaluate a candidate with average credentials, who may be quite able to perform a job well and who performs well in an interview, as a result of a slightly less favorable initial impression. This problem is compounded because different interviewers are likely to view different types of information for the same applicant idiosyncratically.

Similar processes may be operating in performance appraisals, particularly where a history of performance exists. Furthermore, the effectiveness of employee development programs indexed by ratings from performance appraisals may be undermined if previously held beliefs about an individual's performance at one time bias subsequent evaluations (Murphy, Balzer, Lockhart, & Eisenman, 1985).

A potentially very useful direction for future research might be to further delineate strategies for simplification of information such as the categorization model, described in our introductory section, that observers use in processing social information and that underlie descriptions and evaluations of behavior. Then, by inducing raters to exert control over this categorization process (Lord & Smith, 1983), and by providing systems of categories relevant to rating tasks (Cooper, 1983), it may be possible to elicit fairly accurate prototype-based ratings. This approach would attempt to improve rating accuracy by affecting the encoding stage of information processing. Nathan and Alexander (1985) advocated a different focus, suggesting that gains in rating accuracy may result from training raters whose preheld notions about relationships between behavior and performance are idiosyncratic. Their inferential accuracy model holds that improving both raters' sensitivity to normative relationships among behaviors and their thresholds for inferring performance from observed behavior will most enhance accuracy of ratings. On the other hand, it may be possible to affect raters' retrieval of information from memory more effectively (Alba & Hasher, 1983; Larson, 1982). If raters have adequately processed information relevant to ratings from the first, they could be induced to recall behaviors from various cognitive perspectives (Anderson & Pichert, 1978) or to engage in reality monitoring (Johnson & Raye, 1981), a process in which behaviors are recalled along with their contexts. These approaches rest on recent evidence that people generally have more information stored in memory than they are induced to retrieve. Restructuring typical rating conditions to aid retrieval may yield more accurate memory-based ratings.

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MATRIX ORGANIZATION: A SOCIAL EXPERIMENT

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A social experiment was used to assess the effects of matrix structure on organizational processes, role perceptions, and work attitudes. Tests of hypotheses employed a nonequivalent control group design with statistical procedures simulating a complementary, quasi-experimental design termed treatment-effect correlations. Implementing matrix structure caused predicted increases in the quantity of communications, but decreased the quality of these communications. Negative effects on relevant role perceptions, work attitudes, and coordination also occurred. Implications of these findings are discussed in relation to the literature on matrix organization, and suggestions for further research are advanced.

This study presents evidence concerning the effects of matrix structure on organizational processes, role perceptions, and work attitudes. Previous researchers have frequently hypothesized that matrix organization increases capacity for information handling and decision making within organizations by establishing formal, lateral channels of communications that complement and supplement existing hierarchical channels (Davis & Lawrence, 1977; Galbraith, 1973; Hrebiniak & Joyce, 1984). Creating these channels violates classical principles of management concerning unity of command and scalar chains of authority and also complicates decisions concerning delegation by making responsibilities unclear or ambiguous. Studies have suggested that these violations cause increased role conflict and ambiguity and produce negative effects on work attitudes like job satisfaction and involvement (Butler, 1973; Reeser, 1969).

Although the effects of matrix structure have been consistently described in this way, alternative effects could easily be hypothesized. Delbecq and Filley (1974) suggested that matrix structures provide opportunities for "advanced work and collegial interaction with a prestigious set of colleagues" and that "prestige often accrues to the project and to personnel associated with it" (1974: 67). Such effects would not be expected to decrease job satisfaction and involvement. Empirical evidence that could serve to resolve such issues is sparse, despite frequent references to matrix structures in the academic literature and their apparently widespread use.

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Evan (1971) classified research strategies into case studies, field surveys, and laboratory and field experiments. When applied to research concerning matrix structures, this classification reveals that, although several case studies and field surveys have yielded interesting and provocative results, no organizational experiments have been conducted to test propositions concerning matrix structure. Evan failed to find a single instance in which investigation of an organizational problem proceeded from case study through field study to organizational experiment. He took this not as an indication that the process lacked "feasibility or utility, but rather as an indication of a glaring deficiency in the field" (1971: 2). This article reports the results of a field experiment conducted to assess the effects of implementing a matrix structure on organizational processes, role perceptions, and work attitudes.

REVIEW AND PROPOSITIONS

Organizational Processes

Galbraith (1973) argued that matrix organization represents one of several alternatives for dealing with the requirements for information processing imposed by high levels of task uncertainty. When these requirements exceed the capability of basic bureaucratic structures, one response is to increase an organization's capacity for information processing by creating new, formal, lateral channels of communication complementing existing formal, hierarchical ones. This choice allows formal communications to take place not only through an existing hierarchy and chain of command, but also through lateral channels.

Occupants of key lateral roles in these structures, such as program, product, project, or business managers, have responsibility and authority for lateral decision making. Although variations in the degree of lateral responsibility and authority occur in practice, matrix arrangements generally imply a rough equivalence in power between hierarchical and lateral dimensions of the structures (Davis & Lawrence, 1977; Delbecq & Filley, 1974; Galbraith, 1973; Pfeffer, 1981).

The first intended consequence of implementing a matrix structure is to increase the quantity of communication by adding formal but nonhierarchical channels, thus augmenting an organization's basic capacity for information processing. However, a matrix structure should influence the quality or style of communication as well. Davis and Lawrence (1977) noted, for example, that

project or business managers [in matrix organizations] do not unilaterally decide. They manage the decision process so that differences are aired and trade-offs are made in the interests of the whole. They must use their knowledge, competence, relationships, force of personality, and skills in group management to get people to do what is still necessary for project success (1978: 87).

Consequently, most researchers have argued that a matrix structure should increase the participative nature of formal communications. Delbecq and

Filley (1974) also argued that "because of the developmental nature of the work of the project group, a participative colleague relationship is significant for problem-solving success" (1974: 59). Similar propositions are common in the literature (Galbraith, 1973; Lawrence & Lorsch, 1967).

Matrix managers are likely to employ a more participative style than do other managers and may also employ directive or forcing behavior somewhat more. Delbecq and Filley noted that the "function of the project manager is to keep the eye of the group firmly focused on the project task and make sure that problems and difficulties are confronted rather than smoothed over. This may even involve some forcing behavior" (1974: 59). Similar implications may also be found in Lawrence and Lorsch (1967). In summarizing their findings regarding factors important to obtaining high levels of integration, they wrote: "All of these data taken together suggest that while heavy reliance on confrontation is essential [for obtaining coordination], it may also be important . . . to have a back up mode that relies on some forcing Forcing means that the managers will at least reach some decision" (1967: 78). Commenting on matrix structures in particular, Davis and Lawrence (1977) wrote: "In an effective matrix organization, confrontation is the primary mode of conflict management, and forcing or compromise the second most frequently used mode. Forcing, although reducing trust, does at least assure that some action is taken" (1977: 105). Burns and Stalker (1961) also presented an argument with a similar conclusion (1961: chap. 7).

Thus, the literature suggests that implementing a matrix structure should improve coordination by increasing the amount and frequency of formal communication through creating and legitimating new, formal, lateral channels of communication. As this happens, previously informal communication concerning task-related matters is legitimized and carried in these new channels. A decrease in the frequency of informal task-related communication should accompany the increase in formal communication as informal channels become redundant. In addition, the participative and directive quality of formal communications within an organization should increase as workers engage in confrontation and problem solving to balance and respond to multiple supervisors and conflicting objectives.

Role Perceptions and Work Attitudes

The effects on organizational processes discussed above should affect individuals' role perceptions and work attitudes. Increases in role conflict are frequently hypothesized to result from matrix arrangements (Galbraith, 1973; Hrebiniak & Joyce, 1984; Pfeffer, 1981). The increased demands of dual supervision in matrix structures contribute to role overload by causing conflicts between multiple role expectations and individuals' abilities to satisfy such expectations. In addition, the demands of lateral and hierarchical influence structures may be inconsistent, generating a type of role strain called intersender role conflict. These conditions combine to produce a generalized state of role conflict (Rizzo, House, & Lirtzman, 1970).

TABLE 1
Propositions Concerning the Effects of Implementing a Matrix Structure
on Organizational Processes, Role Perceptions, and Work Attitudes

Variables	Predicted Effects of Matrix Structure
Organizational processes	
Frequency of formal communication	Increases
Frequency of informal communication	Decreases
Amount of formal communication	Increases
Participative quality of communication	Increases
Directive quality of communication	Increases
Coordination	Increases
Role perceptions	
Role conflict	Increases
Role ambiguity	Increases
Work attitudes	
Satisfaction with work	Decreases
Satisfaction with supervision	Decreases
Satisfaction with co-workers	Decreases
Satisfaction with pay	Decreases
Satisfaction with promotions	Decreases
Job involvement	Decreases

Butler (1973) suggested that such conflict is especially likely in matrix structures owing to (1) requirements for joint decision making in situations of high task interdependence, (2) competition and bargaining for scarce human and material resources, (3) obscurely defined power and authority relationships, and (4) differences in managerial values and objectives. Pfeffer (1981) argued that a certain amount of conflict is designed into matrix structures, presumably to create confrontation; if managed productively, this process results in higher levels of coordination and an ability to make complex decisions more effectively than do simple bureaucratic procedures (Lawrence & Lorsch, 1967).

Burns and Stalker (1961) argued that conflict results from change. More conflict arises in matrix structures because, as Delbecq and Filley proposed, the "essential feature of the project participant position is its temporary character" (1974: 63). Because projects end and new ones begin, a recurring process of change is inherent in matrix structures. Adopting a matrix structure also increases role ambiguity. In such arrangements, responsibility for task execution rests with both lateral and hierarchical managers, making explicit definition of their respective responsibilities difficult. Reeser (1969) found that engineers with varying degrees of exposure to matrix management showed greater role ambiguity, greater dissatisfaction with personnel practices and supervision, and less loyalty to their organizations than engineers working in functional structures. Reeser's results suggest that matrix structures affect work attitudes to the extent that such structures create negative role perceptions in the forms of role conflict and ambiguity. Rizzo and colleagues (1970) reported significant negative correlations between these

types of role strain and both job satisfaction and involvement, a finding consistent with Reeser's results. Table 1 summarizes the propositions concerning the effects of matrix structure on organizational processes, role perceptions, and work attitudes.

STRATEGY OF INVESTIGATION

As the discussion in the preceding section illustrates, although some propositions concerning the effects of matrix structure tend to predominate in the literature, others could logically be advanced. The lack of relevant experimental evidence perpetuates this ambiguity.

A related question concerns whether such experimental research should be conducted in laboratories, to maximize precision and control, or whether it should be conducted in the field, where some precision and control may be sacrificed to realism, generalizability, and potential sharing of results. These conflicting objectives can, perhaps, best be served through field experimentation using social experiments. A social experiment "is a type of manipulative experiment where the changes are produced, not by the scientist's intervention, but by that of the policy maker or practitioner" (Kaplan, 1964: 164). In a social experiment, a policy maker produces the manipulation and a researcher studies its effects. Social experiments offer a number of significant advantages for improving understanding of matrix structures. Their results are likely to be generalizable because they minimize scale and threshold effects (Kaplan, 1964: 164) and because the phenomena of interest are studied where they ordinarily occur. Campbell (1971) noted that, for experiments on administrative principles, social experiments provide "a basis of experimentation that is closer to home, where the extrapolation is smaller, and where the likelihood of valid extrapolation is greater" (1971: 170).

Social experiments also minimize artificiality and the possibility that the process of experimentation itself is producing the observed results. A research situation and an experimenter's behavior can lead participants to respond and behave differently than they would otherwise (King, 1974; Milgram, 1965; Orne, 1962; Orne & Evans, 1965). Participants in social experiments "may not care that they are subjects because far stronger motivations have been tapped" (Kaplan, 1964: 168).

For these reasons, social experiments provide a useful and desirable method for studying the effects of matrix structures on organizational processes, role perceptions, and work attitudes. Every method has a drawback, however; for social experiments, it is frequently the lack of a comparable control group. The next section describes how this potentially serious problem was overcome with a design using a nonequivalent control group to bolster the internal validity of this study's conclusions.

Experimental Design

In social experiments, researchers do not control the administration of the experimental stimuli. Lacking this control, they require an alternative, which

may take the form of a quasi-experimental design whose purpose is "to introduce the logic of experimentation when control over the scheduling of experimental stimuli is lacking" (Roos, 1973). For social experiments, one attractive logic involves bracketing an event by taking measures of variables of interest before and after administration of stimuli for both the individuals exposed to the manipulation (the experimental group) and individuals not so exposed (the control group). Bracketing identifies experimental and control groups that are generally nonequivalent but are as similar as possible in important respects. This design is often referred to as the nonequivalent control group design (Campbell & Stanley, 1966), or as the untreated control group with pretest and posttest (Cook & Campbell, 1976). Although not true randomized experiments, such designs control for most of the threats to internal validity identified in the two sources just cited, with the exceptions noted in the next paragraph. Coupled with the strengths of social experiments with respect to external validity, a design employing a nonequivalent control group provides a needed complementary focus on internal validity.

Despite the many strengths of this design, it has weaknesses that require researchers to employ a laborious method of investigation in which threats to internal validity are examined one by one. It is important to note that nonequivalent control group designs control for all but three of the threats to internal validity Cook and Campbell (1976) identified. These three, which analysis and interpretation of results must address, are selection-maturation interaction, scaling effects, and local history. In this experiment, the effects of local history, described as "events other than the treatment which affect the experimental group, but not the control group, or vice versa" (Cook & Campbell, 1976: 251), are negligible. Diaries maintained over the course of this experiment¹ revealed no such threats to internal validity. Scaling was not a serious threat either; social experiments minimize scale effects, as discussed in the previous section. However, selection-maturation interaction was a significant potential threat to internal validity. Use of statistical procedures that simulate a complementary quasi-experimental design, termed treatment-effect correlations, addressed this threat. This type of design controls for selection-maturation interaction. Using it in combination with a nonequivalent control group effectively compensates for the limitations that would be present if either design were used alone. The details of the statistical procedures appear in the Methods section.

Description of the Change

The social experiment conducted here was made possible by the reorganization of the Engineering Division of an aircraft manufacturing firm. The firm undertook this reorganization to improve control of projects, the development times of engineering programs, and the motivation of the division's employees. The management's rationale was that assigning personnel to

¹ During this time, the author was employed full-time by the host organization to observe and measure the effects of the reorganization.

projects that overlaid their basic functional workgroups would allow them greater autonomy and facilitate identification with projects. This would in turn increase motivation, shorten development times, and improve control of projects through the new role of project manager. Prior to the reorganization, the Engineering Division was organized functionally, with separate groups for engineering design, drafting, and engineering tests and substantiation.

Nature of the work. The Engineering Division was responsible for the design and testing of new and modified aircraft. After design prototypes had flown and passed certification tests specified by the Federal Aviation Administration (FAA), the firm's Production Division took responsibility for quantity production of the new models. Prior to this transfer of responsibility, three major groups within the Engineering Division played complementary roles. Engineering Design developed new models. Because aircraft are very complex and require the application of considerable technical expertise, departments within this group had been formed to concentrate on different components of aircraft. Some specialized in wing, fuselage, or tail assembly design, and others had responsibility for design of power plants or electrical systems. Thus, the overall task of designing a complete airplane was fragmented and the several departments constituted for this purpose were interdependent. Ultimately, the wing had to mate with the fuselage, the empennage had to provide sufficient control power to maneuver the aircraft, and the power plant had to deliver sufficient thrust to propel it at the desired cruise speed and payload.

In order to ensure that products met these design criteria, the Tests and Substantiations Group conducted evaluations to assess each aircraft's performance and structural integrity, as marketing specifications and governmental regulations required. The group had three departments to accomplish these tasks. The Aerodynamics Department conducted performance analyses and wind tunnel tests. The Flight Test Department actually flew prototype versions of new models to determine experimentally whether or not they met their design specifications and the extent to which they satisfied FAA requirements regarding controllability and aerodynamic safety. The Structures Department determined the loads that an aircraft must sustain in flight and conducted tests to ensure that structures proposed by the Design Group could actually bear these loads in practice. When the results of aerodynamic or structural analyses or tests suggested a problem with a design, appropriate departments in the Design Group made modifications, and new tests were performed before the design became final. Although the greatest interdependence between departments occurred within the Design Group and within the Tests and Substantiations Group, there was significant interdependence between departments in different groups as well.

The Drafting Group became involved in the process as a final design for an aircraft neared completion. Draftsmen transformed design drawings that had been used for prototype construction into production drawings incorporating all the design changes necessary to produce an FAA-certifiable aircraft that met desired performance specifications. In contrast to the work per-

formed in the engineering groups, this work, although intricate, was quite routine. When changes to design drawings were minor, as they often were, a draftsman would simply trace the designer's work, paying a bit more attention to scale and the quality of the finished drawing. Interdependence among draftsmen was relatively low even when individuals were working on highly interdependent parts of an airplane, because the design drawings from which they worked already fit together as a result of previous design and analysis.

Reorganization. The reorganization created a matrix structure by establishing a formal project management system overlaying these three major groups of the Engineering Division. The firm appointed a project manager for each of the aircraft development projects in progress. These people were responsible for overall project integration. Their task was to ensure that personnel effectively attended to the interdependencies that every project involved by providing a management perspective oriented toward whole aircraft rather than toward their subsystems and components. Project managers were assigned greater influence and formal power than the department managers. Department managers were to provide technical direction to their employees who were also assigned to project managers, but project managers actually directed these employees' activities on the projects. This arrangement is the classical division of labor between lateral and hierarchical managers in matrix structures (Davis & Lawrence, 1977). Project managers had the authority to overrule any of the department managers, even on technical matters, although it was expected that they would exercise this prerogative judiciously. The role of project manager was intended to resemble that of the owner of a small engineering or manufacturing firm, and incumbents were viewed as totally responsible for the success or failure of their projects.

Intervention. The firm took several actions to support this reorganization, the new role of project manager, and the intended balance of power between project and functional management. All three groups of the Engineering Division shared some aspects of this intervention; other aspects of the treatment differed for the three groups.

The common aspects of the intervention included preparation of new organizational charts and memoranda summarizing the purposes of the change, broad role descriptions for the new project management function, and brief descriptions of how the new system was intended to function. The firm used several methods to communicate this information, including distribution of the memoranda; addresses by the Vice President of Engineering, who encouraged questions and comments from division personnel; and small meetings between managers of functional groups and their subordinates, beginning at the top of the organization and flowing down the hierarchy. These procedures were followed uniformly across both engineering groups and the Drafting Group.

However, the treatment received by the Drafting Group differed from the treatment of the two engineering groups. In addition to undergoing the administrative changes, drafting personnel were physically relocated to project centers where they sat together with other draftsmen working on the same

project. Personnel from the Engineering Design and Testing and Substantiation Groups were not relocated. Thus, although draftsmen now worked in close proximity to the newly appointed project managers and away from their functional managers, the engineers continued to work in the same areas as they had in the earlier structure, close to their accustomed supervisors and distant from the new project managers, in what were essentially intact functional groupings. Physical relocation involved three significant dimensions of change for the draftsmen: (1) separation from their previous physical work settings with a consequent need to adjust to new work settings and locations, (2) distancing from accustomed supervision and close exposure to new and unfamiliar sources of leadership, and (3) mixing of personnel as functionally based groups were disbanded and reformed around projects. Engineering personnel did not experience any of these changes.

Differences between the drafting and engineering groups. In addition to the differences in the treatments received, the drafting and engineering groups also varied along a number of other dimensions. As would be expected, members of the Drafting Group were not as highly educated as members of the engineering groups and had been recruited primarily from the local community. They also received hourly pay rather than salaries, and they performed more routine tasks, as can be seen in the descriptions of their work. In order to confirm this observation, three judges rated the degrees of task variability within the engineering and drafting groups using scales drawn from the Organization Assessment Instrument (Van de Ven & Ferry, 1980). Results indicated that participants in the engineering groups performed tasks that were intermediate in variability, primarily through the use of discretionary programming (Van de Ven & Delbecq, 1974). In contrast, the Drafting Group performed tasks low in variability, with few exceptional cases.

Another important difference was that the members of the engineering groups had some previous exposure to the use of lateral relations. Liaison roles (Galbraith, 1973) were used in these groups to coordinate information relevant to aircraft development projects. Individuals filling these roles functioned primarily as expeditors who ensured that necessary information was available to others to aid in their decisions. Although the liaison role had formalized responsibility, role incumbents had relatively little legitimate, reward, or coercive power; consequently, they had to rely on knowledge or personal sources of influence (Hrebiniak & Joyce, 1984).

Finally, the engineering and drafting groups also varied in the extent to which they displayed intragroup differences. Generally, the work performed by the engineering groups was more heterogeneous than that of the Drafting Group. Few substantial differences existed in drafting work on different components of an aircraft—an individual working on electrical systems could be redeployed to wing or fuselage drafting with little loss of efficiency. This work was homogeneous in that it was primarily drafting, regardless of the particular aspect of the aircraft being worked on. However, it was generally not possible for engineers to substitute for one another, even within each engineering group. A structural engineer could not easily perform the work

of an aerodynamicist, nor could a wing designer easily design electrical systems.

Assessing the relative "size" of the change. The differences between the drafting and engineering groups, in conjunction with the differences in treatment that they received, suggest that the "size" of the change they experienced varied. This raises the issue of how to characterize size. Beyer and Trice (1978) provided a useful framework for assessing the degree of change involved in a particular intervention, proposing that it can be assessed along four dimensions: pervasiveness, magnitude, innovativeness, and duration. The number of people expected to change their behavior and the amount of time that they will be behaving in new ways indicates pervasiveness (Beyer & Trice, 1978: 18). In this study, pervasiveness was high for both the engineering and drafting groups, because all their members were expected to change their behavior as a result of the reorganization. In addition, because they would be functioning within the constraints of a new organizational structure, this change would affect them during most of their activities. *Duration* refers to the time span over which a change is intended to persist. The duration of this change was also similar for the engineering and drafting groups, because it was proposed that the new structure would last indefinitely.

Although the pervasiveness and duration of the change as experienced by engineering and drafting personnel were similar, the magnitude and innovativeness of the change varied for the two. *Magnitude* refers to the displacement of existing organizational states, and *innovativeness* refers to the degree to which past behaviors provide routines useful in a process of change (Beyer & Trice, 1978: 19). Because lateral relations already existed within the engineering groups, workers there sensed only a change in the degree of lateral managers' influence. However, within the Drafting Group, where no lateral structures existed previously, workers would perceive a totally new—and strong—source of influence. These differences in the treatment's interaction with existing structural arrangements implied a higher magnitude of change for individuals in the Drafting Group.

They would also see the change as more innovative than the engineers would. Draftsmen generally had less formal education and less exposure to the work practices and procedures of other aerospace firms than engineers. Consequently, they had little previous experience, either academic or practical, to draw upon in adapting to the change. In contrast, engineering personnel with experience in other firms had often worked before under this type of management system, which is widely used in this industry. Although not all members of the engineering groups shared such experience, it was present to a degree lacking in the Drafting Group.

In summary, the change as experienced by both the drafting and engineering groups could be characterized as high in both pervasiveness and duration. Magnitude and innovativeness differed, with the Drafting Group experiencing higher levels of both of these dimensions during the intervention.

METHODS

Data Collection

Questionnaires designed to measure process as well as behavioral outcomes of the reorganization were distributed to all members of the Engineering Division whom the reorganization affected directly. The questionnaires were distributed approximately four weeks prior to the beginning of the reorganization, in order to avoid a possible interaction between testing and the intervention, and again six months after the change began. Six months represented the longest time span during which management could maintain the conditions of the experiment without further changes that would have confounded the design.

A control group of industrial engineers and production specialists who worked for the company and who were located in another building was also surveyed before and after the change. These individuals were subject to all the same administrative policies and procedures as the experimental groups, with the exception of the matrix reorganization. Their physical separation from the reorganization addressed threats to internal validity from compensatory rivalry and diffusion of treatment (Cook & Campbell, 1976).

The questionnaires, which took about 25 minutes to complete, were administered at special sessions at which the researcher was present. Respondents completed them anonymously, placed them in sealed envelopes, and deposited them in collection boxes before leaving the room in which the test was administered. Numbers of respondents within the groups at the pretest were: engineering, 33; drafting, 21; and control, 25. At the posttest, engineering had 31 respondents; drafting, 16; and control, 26.

Appendix A presents the details of measurement for variables concerning organizational processes, role perceptions, and work attitudes that were investigated to test the propositions summarized in Table 1.

Statistical Procedures

The differences in the treatments received by the drafting and engineering experimental groups suggested that their data be analyzed separately; presentation of the experiment's results reflects this separation.

The analysis of results from quasi experiments is complex. Results obtained from designs with nonequivalent control groups have been interpreted using analyses conducted between waves of an experiment, within waves, or by some combination of the two methods. Between-wave analysis, which involves tracking individuals longitudinally, is not appropriate for experiments in which assignment to the experimental and control groups is not under an experimenter's control, because nonrandom pretest differences between groups are likely. Instead, Cook and Campbell (1976) recommended within-wave analyses to assess treatment effects in nonequivalent control group designs. Within-wave analyses can also be shown to be mathematically equivalent to an alternative quasi-experimental design, treatment effect correlations (see Appendix B). Because such a design is robust with respect

to threats from selection-maturation interactions, using it is tantamount to including an additional complementary quasi experiment that compensates for the primary weakness of designs using a nonequivalent control group.

The specific statistical procedure employed was to test for significant differences between the mean scores of experimental and control groups within waves of data collected both before and after the reorganization, or treatment. If comparison of the pretest and posttest analyses of variance indicated that overall treatment effects existed, Scheffé tests of post hoc differences between the means of the experimental and control groups were conducted within waves and examined across waves to isolate specific treatment effects. Three patterns of significance between pretest and posttest (within wave) ANOVAs would indicate a possible treatment effect: (1) pretest is nonsignificant, posttest is significant; (2) pretest is significant, posttest is nonsignificant; (3) pretest is significant, posttest is significant. The first two patterns would provide clear evidence that the treatment had an effect by causing or diminishing differences between the experimental and control groups. The third is more equivocal; an effect could be present if the pattern of significant differences between the experimental and control groups differed in posttest and pretest. Such variation cannot be detected by ANOVA and requires post hoc inspection of means, as is described in the Results section.

These analytic methods result in more conservative tests for the effects of the treatment on the dependent variables than do tests that require the matching of pretest and posttest scores for each individual. Therefore, statistically significant results are also more likely to be practically significant. An additional strength is that there is no compelling reason to specifically identify individuals in the analyses. Respondents can complete questionnaires anonymously, which minimizes perceived risk and encourages candid and valid responses.

RESULTS

Table 2 presents the intercorrelations among all variables employed in this study. Significant relationships that are generally consistent with previous research and theory exist among several of the measures. Role conflict and ambiguity were negatively related to both job involvement and satisfaction and positively related to the frequency of informal lateral communication. This result is consistent with the argument advanced in the first main section, that deviations from the use of formal, hierarchical communication paths introduce conflicting sources of information, thus heightening conflict and ambiguity. Furthermore, the positive correlation between coordination and role ambiguity ($r = .23, p < .05$) suggests that such an increase may introduce valuable new perspectives and bring consequent improvement in coordination.

The interesting relationships between coordination and the other variables also merit comment. The results show negative relationships between

TABLE 2
Intercorrelations^a among Measures of Role Perceptions,
Work Attitudes, and Organizational Processes

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Role conflict													
2. Role ambiguity	.48												
3. Job involvement	-.22	-.24											
4. Satisfaction with work	-.47	-.34	.29										
5. Satisfaction with supervision	-.27	-.43	.11	.32									
6. Satisfaction with people	-.37	-.22	.24	.47	.32								
7. Satisfaction with pay	-.34	-.32	.17	.37	.17	.33							
8. Satisfaction with promotions	-.10	-.28	.23	.36	.44	.07	.30						
9. Frequency of formal communication	.17	.10	-.06	-.22	.17	.00	-.15	.13					
10. Frequency of informal communication	.34	.38	-.11	-.28	-.13	-.05	-.27	-.10	.41				
11. Amount of formal communication	.04	-.04	-.03	.05	.27	.07	-.03	.17	.46	.12			
12. Participative quality of communication	.01	-.12	.24	.14	.32	.22	.00	.34	.22	-.06	.23		
13. Directive quality of communication	-.01	-.09	.10	-.03	.35	.12	.00	.08	.01	.04	-.19	.12	
14. Coordination	.00	.23	.06	-.05	-.20	.07	.06	.01	-.22	-.17	-.32	.17	-.29

^aN = 79; correlations of .22 and .29 are significant at $p < .05$ and .01, respectively.

coordination and both frequency and amount of formal communication ($r = -.22, p < .05$; $r = -.32, p < .01$, respectively), as well as between coordination and the directive quality of communication ($r = -.29, p < .01$). This finding is also consistent with information processing theory (Galbraith, 1973; Hrebiniak & Joyce, 1984), which suggests that as levels of information processing increase, a point where reorganization is required is reached. At this point, existing hierarchical channels cannot carry the information required for effective decision making and attempts at coordination through increased use of an overloaded structure are nominal.

Process Variables

The results shown in Table 3 and Figure 1 indicate that implementing a matrix structure had significant effects on all process variables. The effects on the quantity of formal and informal task-related communications were as predicted, but were confined to the Drafting Group, where the degree of change was more extensive. However, coordination in this group actually declined, perhaps owing to accompanying unfavorable decreases in the participative and directive quality of communication.

It was proposed that the amount and frequency of formal communication would increase through the legitimization of lateral channels for task-related communication, resulting in a decrease in the frequency of informal task-related communication. The frequency of formal communication increased in the Drafting Group, but remained relatively stable in the engineering and control groups. Differences among the three groupings were significant at both the pretest and posttest ($F_{\text{pre}} = 7.33, p < .01$; $F_{\text{post}} = 13.42, p < .01$) because of higher levels of communication within both of the experimental groups. However, these differences were even stronger at the posttest because the frequency of formal communication increased within the Drafting Group.

Effects of the treatment were also noted for the amount of formal communication ($F_{\text{pre}} = 1.18, \text{n.s.}$; $F_{\text{post}} = 5.87, p < .01$), again because of an increase in the amount of communication within the Drafting Group at the posttest ($p < .05$). These results indicate that both the amount and frequency of formal communication showed predicted increases in quantity as a result of implementation of matrix structure.

The frequency of informal task-related communications also declined as predicted within the Drafting Group. Whereas this group reported a higher frequency of informal communication than the control groups at the time of the pretest ($p < .05$), these differences were not significant at the posttest ($F_{\text{pre}} = 3.69, p < .05$; $F_{\text{post}} = 1.90, \text{n.s.}$).

The change in structure altered the quality as well as the quantity of formal communication, but in an unpredicted and unfavorable direction. Effects for participative communication ($F_{\text{pre}} = 1.87, \text{n.s.}$; $F_{\text{post}} = 5.66, p < .01$) were noted because of a decrease in the level of this variable within the Drafting Group compared to the engineering ($p < .05$) and control ($p < .01$) groups. The use of directive communication also decreased in the

TABLE 3
Results of Analyses of Treatment Effects
on Variables Measuring Organizational Processes

Dependent Variables	Tests	Group Means			Post Hoc Comparisons ^b		
		Engineering	Drafting	Control	Fa	E/C	D/C E/D
Coordination	Pre	18.60	18.20	18.90	.19		
	Post	18.60	14.90	19.20	7.63**		<.01
Quantity of communication Frequency of formal	Pre	22.30	23.10	16.70	7.33**	<.05	<.05
	Post	22.10	26.30	16.30	13.42**	<.05	<.01
Amount of formal	Pre	3.39	2.81	3.08	1.18		
	Post	3.52	4.50	2.85	5.87		<.05
Frequency of informal	Pre	14.70	16.90	12.40	3.69*		<.05
	Post	15.40	16.00	12.90	1.90		
Quality of communication Participative	Pre	8.64	8.58	9.64	1.87		
	Post	8.33	6.37	8.93	5.66**		<.05
Directive	Pre	6.06	6.81	5.20	5.76**		<.05
	Post	5.97	5.62	5.74	.18		

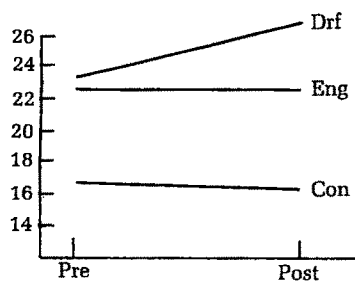
^a Numbers of respondents in the engineering, drafting, and control groups were: pretest, 33, 21, and 25, respectively; posttest, 31, 16, and 26.

^b Levels of significance using Scheffé tests for post hoc comparisons. E = engineering, D = drafting, and C = control.

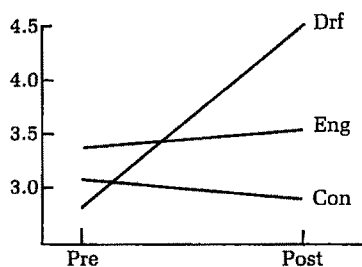
* $p < .05$

** $p < .01$

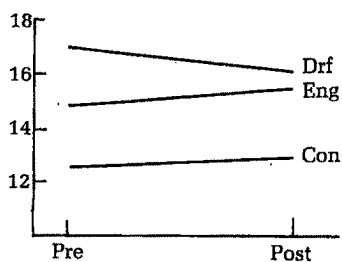
FIGURE 1
Means of Process Variables
Before and After Matrix Reorganization



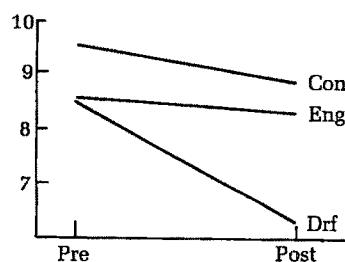
a. Frequency of Formal Communication



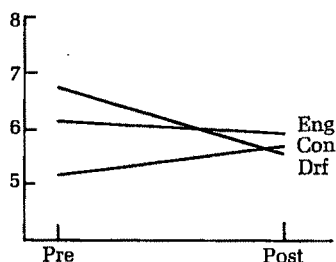
b. Amount of Formal Communication



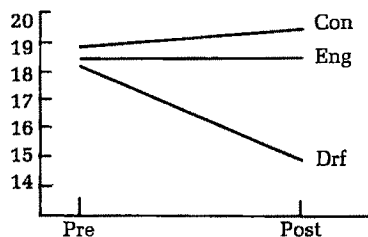
c. Frequency of Informal Communication



d. Participative Quality of Communication



e. Directive Quality of Communication



f. Coordination

^a Drf = drafting, Eng = engineering, and Con = control; pre = pretest and post = posttest.

Drafting Group, resulting in the elimination of pretest differences with the control group ($p < .05$) and no significant differences among the groups at the posttest ($F_{\text{pre}} = 5.76, p < .01; F_{\text{post}} = 0.186, \text{n.s.}$).

Coordination decreased in the Drafting Group ($F_{\text{pre}} = 0.192, \text{n.s.}; F_{\text{post}} = 7.63, p < .01$), despite increases in the quantity of communication in that group. Coordination was significantly lower when contrasted with the engineering ($p < .01$) and control ($p < .01$) groups at the posttest; no significant differences had existed at the pretest.

These results have interesting implications regarding implementation of matrix structures. Although the reorganization brought predicted improvements in the quantity of communications in one experimental group, the change unfavorably affected the quality of communications, and corresponding decreases in coordination occurred. This suggests that implementing a matrix structure must favorably affect both the quantity and quality of communications for it to result in such desirable outcomes as improved coordination.

Role Perceptions and Work Attitudes

Table 4 and Figure 2 present the results of analyses of the effects of the reorganization on role perceptions and work attitudes. Significant effects were noted for role ambiguity, job involvement, satisfaction with work, satisfaction with co-workers, and satisfaction with promotions. Changes within the Drafting Group were responsible for these effects, most of which were negative in direction and all of which were unfavorable.

Levels of role ambiguity among the experimental and control groups differed at both the pretest and posttest ($F_{\text{pre}} = 10.48, p < .01; F_{\text{post}} = 8.46, p < .01$). However, the changing pattern of significant post hoc comparisons between groups indicates a significant treatment effect on the level of role ambiguity within the Drafting Group. These respondents were higher than the control group in role ambiguity after ($p < .01$), but not before the change. Moreover, although at the pretest ambiguity was lower in Drafting Group than in the engineering groups ($p < .01$), increased ambiguity in the Drafting Groups eliminated this difference at the posttest.

These results are consistent with the observed decreases in both the participative and directive quality of formal communications in this group. Both direction from supervisors and participation in decision making relevant to tasks clarify roles. When use of both of these methods for obtaining role clarity declines, as in the present case, role ambiguity should increase.

The reorganization also affected job involvement ($F_{\text{pre}} = 0.23, \text{n.s.}; F_{\text{post}} = 6.38, p < .01$). Involvement decreased within the Drafting Group, but scores for both the engineering and control groups remained stable, resulting in significant differences between the Drafting Groups and the others ($p < .01$ for both).

The new structure also negatively affected job satisfaction. Significant treatment effects were noted for satisfaction with work ($F_{\text{pre}} = 1.04, \text{n.s.}; F_{\text{post}} = 3.30, p < .05$), co-workers ($F_{\text{pre}} = 1.75, \text{n.s.}; F_{\text{post}} = 3.48, p < .05$),

TABLE 4
Results of Analyses of Treatment Effects
on Role Perceptions and Work Attitudes

Dependent Variables	Tests	Group Means			F _a	Post Hoc Comparisons ^b		
		Engineering	Drafting	Control		E/C	D/C	E/D
(a) Role Perceptions								
Role ambiguity	Pre	4.32	2.95	3.39	10.48**	<.05		<.01
	Post	4.22	4.84	3.31	8.46**	<.05	<.10	
Role conflict	Pre	4.78	4.37	4.52	0.70			
	Post	4.36	4.68	4.14	1.30			
Job involvement	Pre	54.90	54.50	53.70	0.23			
	Post	50.50	43.60	52.50	6.38**		<.10	<.01
(b) Work Attitudes								
Satisfaction with work	Pre	33.30	37.90	35.60	1.04			
	Post	32.50	27.40	37.50	3.30*		<.05	
Satisfaction with supervision	Pre	35.40	42.10	37.50	2.31			
	Post	34.60	35.80	38.20	0.52			
Satisfaction with co-workers	Pre	41.00	42.00	36.80	1.75			
	Post	42.10	33.90	40.50	3.48*			<.05
Satisfaction with pay	Pre	4.91	6.57	8.78	2.13			
	Post	4.84	2.81	6.69	2.10			
Satisfaction with promotions	Pre	4.02	6.47	10.32	6.91**	<.01		
	Post	4.06	2.25	10.84	15.30**	<.01	<.01	

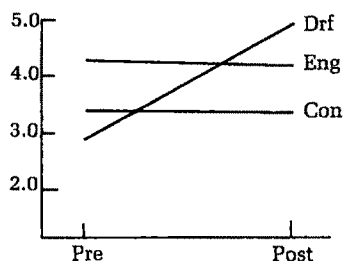
^a Number of respondents in the engineering, drafting, and control groups were: pretest, 33, 21, and 25, respectively; posttest, 31, 16, and 26.

^b Levels of significance using Scheffé tests for post hoc comparisons. E = engineering, D = drafting, C = control.

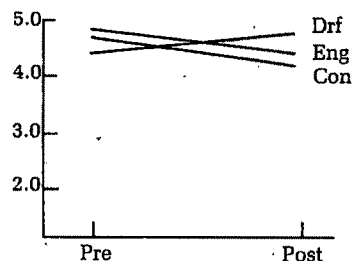
* $p < .05$

** $p < .01$

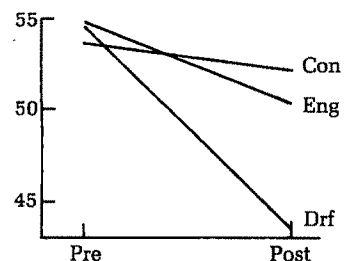
FIGURE 2
Means of Role Perception and Work Attitude
Variables Before and After Matrix Reorganization



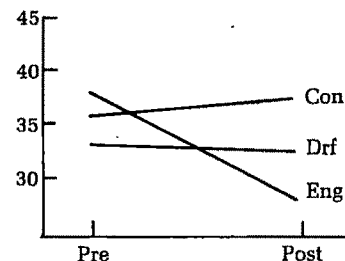
a. Role Ambiguity



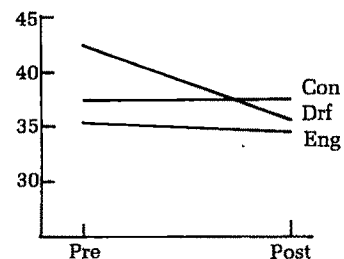
b. Role Conflict



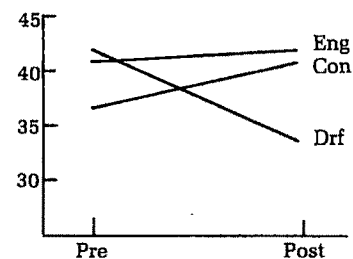
c. Job Involvement



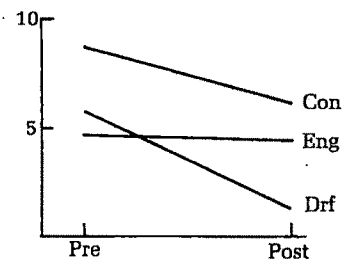
d. Satisfaction with Work



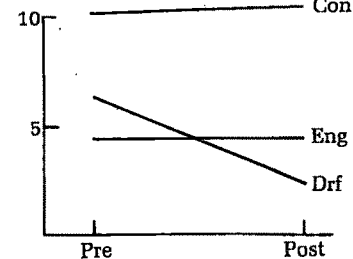
e. Satisfaction with Supervision



f. Satisfaction with Co-workers



g. Satisfaction with Pay



h. Satisfaction with Promotions

^a Drf = drafting, Eng = engineering, and Con = control; pre = pretest and post = posttest.

and promotions ($F_{\text{pre}} = 6.91, p < .01; F_{\text{post}} = 15.3, p < .01$). Satisfaction with work decreased within the Drafting Group, but levels within the engineering and control groups remained stable. Work satisfaction was significantly lower in the Drafting Group than in the control group at the posttest ($p < .05$); such a difference did not exist prior to the change. Satisfaction with co-workers similarly declined for the Drafting Group. Following the reorganization, significant differences existed between the drafting and engineering groups ($p < .05$); such differences did not exist prior to the change.

Satisfaction with promotions also declined within the Drafting Group. This result is particularly interesting given the low pretest levels of this variable. Because of the design of this experiment, scaling was not a serious threat to the validity of the conclusions in general. However, the very low levels of satisfaction with promotions within both experimental groups suggests the plausibility of such a threat in this case. Specifically, a basement effect is possible (Cook & Campbell, 1976) because there is less possibility of negative movement on this scale (range 0-27) when scores are very near its lower extreme. The strength of the treatment's effect is evident here; satisfaction with promotions declined even though pretest scores were in the very lowest ranges of the instrument. Following the reorganization, the Drafting Group scored significantly lower than the control group ($p < .01$) on this criterion, whereas no significant differences had existed at the pretest.

The results for the drafting group are consistent with hypotheses. However, the engineering groups again showed few effects from the change, and there was an unexpected lack of evidence for effects of implementing a matrix structure on perceived role conflict in any group.

DISCUSSION

The results of this study indicate that matrix structure has strong effects on relevant organizational process variables, role perceptions, and work attitudes. These results differ in some respects from the popular view of the effects and costs of matrix organization as reflected in the propositions of this study.

Two unexpected results of this research merit discussion. The first is its failure to find any effect of the matrix reorganization on role conflict in either of the experimental groups. This is notable given the dominance of this hypothesis in the literature.

One possible explanation of this finding is the complexity of the construct of role conflict. As defined and measured by Rizzo and colleagues (1970), generalized role conflict is produced by inconsistency in self- and other behavioral expectations (intersender conflict), behavioral standards for self and role (person-role conflict), multiple role requirements (intrarole conflict), and performance capability and role demands (role overload). Implementing a matrix structure may not affect all of these. It would not be likely to affect person-role conflict. Role overload would be affected if time pressures resulting from structural change and project activity were high.

However, in this case such pressures were low, because the firm instituted the change when project activity was slack to allow available resources to be concentrated on the transition in structure.

What should have changed were levels of intersender and intrarole conflict. However, the extent to which the demands of members of a role set are recognized and perceived as legitimate can affect these conflicts. The high level of role ambiguity in the Drafting Group, perhaps the result of decreases in participative and directive communication, may have blocked changes in intersender and intrarole conflict. The lack of conflict effects among engineers is symptomatic of and consistent with the overall lack of treatment effects in this group. This is the second unusual result of this study.

Differences in the treatment received and characteristics of the engineering and drafting groups may account for the differences in results for the groups. For the Drafting Group, the reorganization involved physical relocation, proximity to new superiors, and disbanding and reformation of functional groups around projects. Higher levels of task variability within the engineering groups had previously necessitated more complex coordinating mechanisms in the form of liaison roles. Consequently, engineers, unlike draftsmen, had some previous exposure to lateral relations. One possible interpretation of the results reported here is that when the magnitude and innovativeness of a change (Beyer & Trice, 1978) are small, reorganization has fewer behavioral consequences than when the change is larger along these dimensions. In this case, the observed differences in the effects of the treatment on the engineering and drafting groups suggest that important dimensions of the size of a change may include changes in physical locations of organizational members and in their locations relative to authority figures and co-workers, as well as changes in administrative procedures. The Drafting Group scored higher on all of these dimensions, suggesting some relationship between the size of an organizational change and the degree of behavioral and attitudinal adjustment of persons engaged in the change.

The lack of process effects within the engineering groups supports this view. No effects emerged among engineers for role perceptions, work attitudes, or process outcomes. Differences in the treatment received by the engineering and drafting groups suggest a view of organizational design and change that is more complex than a simple structural view. Realization of the intended process outcomes of the change in the engineering groups may have required more than a simple adjustment in administrative structure. The primary intervention in this case was structural; supporting secondary interventions—such as physical relocation or another means—may be necessary to implement a primary change (Hrebiniak & Joyce, 1984).

This observation is particularly interesting in light of the inconsistent results obtained for the quantity and quality of communication within the Drafting Group. Apparently, the combination of matrix support systems—physical relocation and proximity to supervision—and the use of a new

administrative structure was sufficient to produce the intended increase in communication in this group. No changes in the quantity of communication were noted in the engineering groups, where only administrative structure was altered. This suggests that both matrix structure and matrix systems are required to produce changes in the quantity of communication. However, systems and structure were insufficient to change the quality of communication. Davis and Lawrence (1977) suggested that matrix management requires not only matrix structure and support systems, but a supportive culture as well. The lack of favorable change in the quality of communication in the Drafting Group may reflect the absence of such a culture. This research provides evidence supporting the view that implementing complex changes requires multiple interventions. This requisite complexity may help explain the growing disenchantment with matrix structures in the popular literature (e.g., Peters & Waterman, 1982).

This study also raises an interesting theoretical issue for future research concerning the degree to which lateral channels of communication can and should substitute for hierarchical channels. Current thinking is that lateral channels should supplement rather than replace existing hierarchical channels (Galbraith, 1973; Hrebiniak & Joyce, 1984). Lateral channels are overlaid on existing hierarchical channels, and new lateral structures depend on what Hrebiniak and Joyce termed the "basic operating structure" (1984: 149). It may be that effective matrix arrangements substitute new lateral channels of communication for hierarchical ones, altering basic operating structures as well, and creating a situation in which both lateral and hierarchical dimensions of matrices depend on one another and neither can stand alone. Although this image has intuitive appeal, it runs counter to current thinking concerning the elaboration of complex organizational forms like matrix structures and deserves further research.

The complexity in the treatment administered in any reorganization, and in this study in particular, raises interesting issues concerning the generalizability of social experiments. Although external validity should be higher than with many other types of research design, the peculiarities of particular interventions raise an issue. From what and to what can researchers employing such designs generalize? As Galbraith noted, the problem concerns providing useful information regarding "a specific organization providing specific services at a specific point in time to specific clients in a specific location while employing a specific group of people" (1977: 7). Characterizing the size of a change along dimensions such as those Beyer and Trice (1978) proposed may facilitate informed generalization by avoiding specification of the change to such a degree that similarities are obscured, inconsequential differences are aggrandized, and generalization is rendered impossible. The question of just what is inconsequential, however, is empirical, and further research explicitly measuring Beyer and Trice's dimensions of change would be valuable in exploring the usefulness of such schemes for facilitating generalizability.

A related point concerns the extent to which the time elapsed between pretest and posttest can explain the results of this study. Lewin (1947) argued that as organizations go through periods of change, an initial disruption occurs that diminishes over time, providing the change is implemented properly. However, current theory does not allow specifying the time required for the negative effects of change per se to diminish. It is possible that to some extent such effects confound the results of this experiment. Such confounding is less likely the longer that experimental conditions can be maintained. Since other events may also impinge on a study like this one, potential threats from these other sources must be weighed against the desirability of minimizing change-related effects through longer time spans of measurement and of administering posttests when interpretability is highest. Such a procedure was followed in this research.

Finally, the relative desirability of social experiments as a method for learning about organizations should be considered. Although the complexity of treatments and confounding with change-related effects can make generalization difficult, researchers widely view such experiments as desirable. Nevertheless, they are still rare, which is problematic for several reasons. Social experiments afford a degree of internal and external validity that is not possible within the more frequently used concurrent study. Although social experiments do not automatically control for all threats to internal validity, they do require investigators to think systematically about what conclusions they may reasonably draw and thus to productively consider issues that more conventional inquiries rarely raise.

Moreover, social experiments are more likely to produce results that have usable implications. The strength of manipulations and their consequent realism facilitate external validity, and conclusions regarding the effects of treatments on relevant criteria are causal. Thus, practical uses of the results of such experiments are more likely than in simpler concurrent studies that do not have these features.

Finally, social experiments fill an important theoretical gap identified by Evan (1971). An individual researcher may not and need not pursue an issue from case study, through survey and laboratory experiment, and on to field experiment, but such a process should emerge for each issue as results accumulate across studies. For many issues, the most serious gap in this process is a lack of field experiments, particularly social experiments. Future research should address this need.

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APPENDIX A

Measurement

Organizational process. Coordination was measured using scales developed by Georgopoulos and Mann (1962). Scores range from 7 to 35, with high scores indicating higher levels of coordination. Items tap relevant aspects of coordination, including the extent to which various work activities fit together, are not in conflict, are well-timed, and collectively support organizational objectives. Coefficient $\alpha = .81$.

Communication was also measured using scales developed by Georgopoulos and Mann. The frequency of both formal and informal, job-related, verbal communication was measured ($\alpha = .86$ and $\alpha = .84$, range 7-35); the total amount of formal communication was also measured.

This instrument also contains a 7-item scale measuring the extent of the directive or participative quality of communication. To confirm the factor structure for quality, these items underwent a principal components factor analysis with varimax rotation, which yielded three factors. Factor 1, with items relating to providing direction and giving orders, was designated the directive quality dimension ($\alpha = .74$, range 2-10). Factor 2, with items measuring solicitation of suggestions, requests for information, and support, represented the participative quality dimension ($\alpha = .64$, range 3-15). Factor 3, containing two items concerning criticism and excess or unnecessary information ($\alpha = .55$), was not included in further analysis because it was irrelevant to the propositions tested.

Role perceptions and work attitudes. Role conflict and ambiguity were measured using an instrument developed by Rizzo, House, and Lirtzman (1970). Role conflict refers to the compatibility or incompatibility between individuals' values and role behavior, time and resources and role behavior, and self- or other behavioral expectations; role ambiguity refers to the extent to which individuals are clear regarding their goals, authority, responsibility, and expectations for role performance ($\alpha = .87$ and $\alpha = .84$; range 1-7, with 7 indicating high conflict or ambiguity).

Job satisfaction was measured using the Job Descriptive Index (Smith, Kendall, & Hulin, 1969). For the five facets of satisfaction included, $\alpha = .87$ for satisfaction with work, $\alpha = .72$ for supervision, $\alpha = .82$ for co-workers, $\alpha = .75$ for pay, and $\alpha = .80$ for promotions. Scores for satisfaction with work, supervision, and co-workers could range from 0-54; those for pay and promotions, from 0-27, with high scores indicating higher satisfaction.

Job involvement was measured using an instrument developed by Lodahl and Kejner (1965) having 20 items with response formats ranging from 1, low involvement, to 4, high involvement. Scale scores could therefore range from 20-80 ($\alpha = .86$).

APPENDIX B

Treatment Effect Correlation

This term refers to a quasi-experimental design in which measures of a treatment are correlated with measures of the criterion taken before and after administration of the treatment. The resulting statistic is termed a treatment-effect correlation. If no systematic differences among treatment and control groups exist, the correlation between the treatment, coded as a dummy variable, and the criterion will not differ significantly from 0. If exposure to the treatment has affected the criterion, the treatment-effect correlation between this same dummy variable and the posttest measure should be significant.

The procedure is believed to control for selection-maturation interaction because increased variation in the criterion scores would depress the correlation. Such would be the case in selection-maturation, where the variation among scores at a posttest would be higher than that at a pretest because one group is maturing more quickly. Thus, a significant treatment-effect correlation would provide evidence for the effects of a manipulation despite any aggravating effects due to selection-maturation interaction working to depress the obtained correlation.

For a single-treatment, single-control-group case in which the levels of the treatment can be coded using dummy variables (0,1) and then correlated with the criterion, the significance of the resulting point-biserial correlation is mathematically equivalent to that obtained by conducting a t-test for the differences between the pretest means of the experimental and control groups. Where multiple levels of a treatment exist, the multivariate generalization of the treatment-effect correlation would be the regression of the criterion on a set of dummy variables representing membership in the multiple-treatment and control groups. This regression is mathematically equivalent to one-way analysis of variance conducted among treatment and control groups within waves of a study (Draper & Smith, 1966), the method of analysis employed here. Comparing the results of these analyses across pretest and posttest therefore yields the same information as treatment-effect correlations computed in the conventional way, thereby simulating this design and controlling for selection-maturation interaction.

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PERFORMANCE, SLACK, AND RISK TAKING IN ORGANIZATIONAL DECISION MAKING

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This research paper investigates the relationship between organizational performance and risk taking in organizational decision making. A complex model is proposed in which the direct relationship, which is triggered by performance below acceptable levels, is negative, but the indirect relationships, which are mediated by organizational slack and decentralization, are positive. A test of the model for a cross-sectional sample of firms shows general support for the model. The findings have implications for theories that view change as arising from stable organizational processes.

Recent advances in the theory of individual decision making have emphasized the role of reference or target levels in making choices. Although ideas of this genre are not entirely new to organizational research—the concept of aspiration level being a familiar one in theories of organizational decision making (March & Simon, 1958; Padgett, 1980; Simon, 1976, 1979)—recent research has generated interesting new evidence on this theme. In particular, one of the main predictions of prospect theory (Kahneman & Tversky, 1979), supported by empirical evidence, is that although decision makers are risk-averse in the domain of gains (above the reference level), they are often risk-seeking in the domain of losses (below the reference level). Using prospect theory and some other psychological findings, Arrow (1982) argued that “an important class of intertemporal markets shows systematic deviations from individual rational behavior and that these deviations are consonant with evidence . . . collected by psychologists” (1982: 8).

These findings at the individual level were similar to earlier speculations and some empirical results at the organizational level. Cyert and March (1963) raised parallel questions about the relationship between organizational success or failure and innovation by organizations. In the spirit of addressing such questions, this research investigated the relationship between organizational performance and risk taking in organizational decision making.

The support of the Graduate School of Business, Stanford University and the Spencer Foundation is gratefully acknowledged. The study is based on the author's doctoral dissertation, which won the Best Doctoral Dissertation Proposal award and the R.J. Reynolds Industries, Inc., Fellowship from the American Assembly of Collegiate Schools of Business in 1982-83. A deep debt is owed to Pradip Khandwalla of the Indian Institute of Management, Ahmedabad, India for the use of parts of his data on U.S. corporations. Comments on an earlier draft of this paper from Jim March, Dave Anderson, Bob House, and Martin Evans are gratefully acknowledged.

A theoretical model is proposed in which there is a negative direct relationship between performance and risk taking. However, the indirect relationships, mediated by decentralization and organizational slack, are positive. The research effort examined top executive-level decision makers and decisions of strategic importance, such as those concerning acquisitions, new investments, and raising long-term capital.

THREE UNRESOLVED ORGANIZATIONAL PROBLEMS

Although the organizational literature has not directly addressed the relationship between performance and risk taking, three areas of inquiry that have captured much interest are relevant to this question. These are organizational responses to decline, organizational innovation, and risk and return. In every one of these areas, however, the research findings are unresolved and sometimes contradictory.

Although these three organizational problems may seem to be unrelated, one key issue is common to them all. In response to declines in performance, the thesis of "threat-rigidity effects" (Staw, Sandelands, & Dutton, 1981: 501) predicts conservative, status-maintaining decisions rather than radical, high-risk decisions. Organizational innovations are caused, among other factors, by risk taking in organizations; innovations can often result from successful risk taking. An illegal act usually has high variance in outcomes associated with it; it is a riskier decision than a legal act.¹ Thus, one of the theoretical issues underlying all three problems is the relationship between organizational performance and risk taking in organizational decision making.

Organizational Responses to Decline

Recent years have witnessed an increased emphasis on the processes related to organizational decline (Whetten, 1980). Some of the theories emphasize how decline triggers corrective processes in organizations, and others point out that decline triggers processes that hasten organizational death.

Hirschman (1979) proposed that processes of decline in organizations activate their own counterforces. Managements of organizations find out about their failings via two alternatives, the exit and the voice options, and are compelled to search for ways to correct those failings. Cyert and March (1963) also proposed a model in which organizations respond to decline by corrective processes. Other theorists have proposed that organizational crises can be opportunities for innovation (Lindblom, 1968; Whetten, 1981; Wilson, 1966).

On the other hand, Staw and colleagues (1981) made the case for a multilevel theory of threat-rigidity effects in organizations as a response to

¹ Risk, as used here, refers to the uncertainty of the outcomes of an organization's resource commitments. Usually, economic approaches to studying risk measure it by the variance of the probability distribution over the outcomes of resource commitment (Armour & Teece, 1978; Fisher & Hall, 1969; Shepherd, 1979). The present research follows this substantive interpretation of risk.

adversity. Under conditions of adversity, a restriction of information processing and a tightening of control occurs. Along similar lines, Smart and Vertinsky (1977) argued that during a crisis, fear of failure incapacitates decision makers. If adversity leads to such rigidity and incapacitation, it seems likely that decision makers would undertake conservative rather than high-risk decisions in response to declines in performance.

Organizational Innovation

One of the questions that has been examined in the literature on innovation is whether organizational success or failure is a better predictor of organizational innovation. As in the case of organizational responses to decline, the literature offers support for either argument. In his pioneering historical study, Chandler (1966) pointed out that the M-form innovation, a multidivisional structure with a separation of operating and strategic levels, emerged in Dupont, General Motors, and Standard Oil (New Jersey) as a result of continued poor performance in all three organizations. Peterson and Berger (1971) found evidence of the use of corporate entrepreneurship in the popular music industry as a means of coping with environmental threats. Staw and Szwejkowski (1975) found that organizations operating in lean environments are more likely to engage in illegal acts. Manns and March (1978) found that under conditions of relative adversity, departments at Stanford University, particularly those of relatively low prestige, introduced more innovations in their curricula. But there is evidence for the opposite position as well. Mansfield (1963) and Knight (1963) found some support for the hypothesis that successful firms were more innovative than unsuccessful ones.

Risk and Return

The economic literature on industrial organization has addressed the relationship between risk and return. According to economic theory (Armour & Teece, 1978; Fisher & Hall, 1969; Shepherd, 1979), most organizations are risk-averse, and a risk-averse organization will not undertake a high-risk decision unless the decision delivers a high expected return. Thus, a positive relationship is predicted between risk and return. But Bowman (1980, 1982) empirically studied the within-industry relationship between risk and return for several industries and found that the relationship was negative in most of them. He termed this the "risk-return paradox" (Bowman, 1980: 24) and proposed that one explanation of this finding would be that poorly performing organizations take more risks.

THEORETICAL BACKGROUND AND A STRUCTURAL EQUATION MODEL

The thesis of this paper is that the unresolved findings on organizational responses to decline, organizational innovation, and risk and return can be understood better by studying both the direct and indirect relationships between organizational performance and risk taking in a structural model of

the relationship. This model proposes that in addition to the negative, direct relationships between performance and risk taking, there exist positive, indirect relationships that are mediated by decentralization of decision making and organizational slack. One reason why past findings have been contradictory is that research has tended to examine different parts of an interconnected system of relationships.

Performance and Risk Taking in Organizational Decisions

In the model developed in this research, it is hypothesized that poor performance drives risk taking in organizational decision making. Underlying this hypothesis is the concept of satisficing levels of organizational performance (March & Simon, 1958; Simon, 1976) and problem-motivated search. Performance below satisficing levels increases risk taking, and performance above satisficing levels decreases risk taking. Figure 1 shows why performance and risk taking are expected to be negatively related. This simplified hypothetical illustration of a choice between two organizational decisions involving different risk levels shows how decisions mediated by aspiration level operate in the theoretical model.

In this figure, returns are plotted along the X-axis and the corresponding probability densities of returns along the Y-axis. X_s represents the satisficing level of performance. The figure illustrates two separate contexts, good performance and poor performance, for the decision; they correspond respectively to performance above and below satisficing level. An organization is faced with a simple choice between two decisions, D_1 and D_2 , that have the same expected return, X_e , but different variances or associated risks. D_1 represents a low-risk (σ_1^2) decision to invest, say, in plant renovation; D_2 represents a higher risk (σ_2^2) decision to invest, say, in R&D or in the acquisition of a subsidiary. The decision rule the organization uses is to maximize the cumulative probability of obtaining an outcome in terms of performance that exceeds the minimum acceptable,² represented by the shaded area under the curve to the right of X_s . This rule predicts different decisions depending on whether an organization is performing well or poorly—operating above or below satisficing level. When performance is above satisficing level, an organization will choose the lower risk decision, and when performance is below satisficing level, it will choose the higher risk decision. This suggests the behavioral prediction:

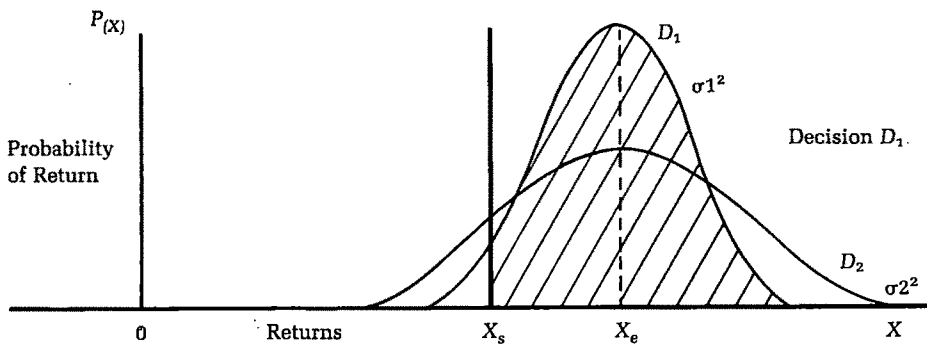
Hypothesis 1: Organizational performance has a negative relationship with risk taking in organizational decisions: poorly performing organizations engage in more risk taking than organizations that are performing well.³

² This is consistent with the position taken by most organization theorists that organizations seek to maximize their chances of survival when faced with uncertainty (Cyert & March, 1963; Pfeffer & Salancik, 1978; Thompson, 1967).

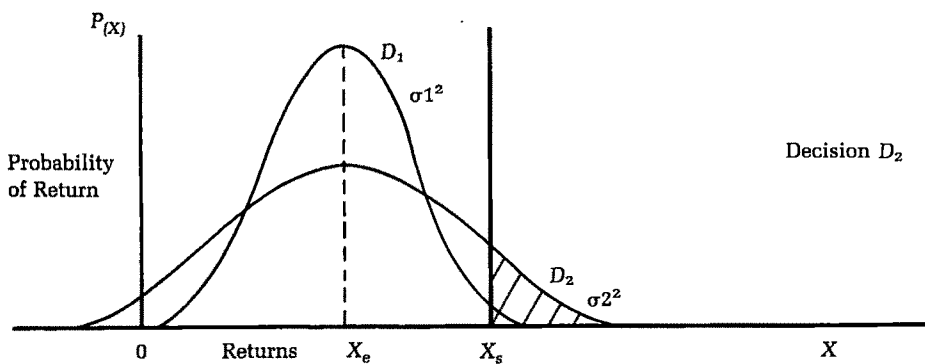
³ A competing theoretical argument may be made that human factors such as hubris or boredom may lead to risk taking so that performance is positively related to risk taking. The current model essentially provides a critical test between the two hypotheses. This was suggested by an anonymous reviewer.

FIGURE 1
Performance Level and Risk Taking^a in Organizational Decisions^b

(a) Performance above Satisficing Level



(b) Performance below Satisficing Level



^a Shaded area under the curve is the cumulative probability of obtaining a performance outcome above the satisficing level. X_s is the satisficing level; X_e is the expected return.

^b Decision D_1 : renovation of plant; decision D_2 : acquisition of subsidiary/investment in R&D.

Organizational Performance and Slack

Cyert and March (1963) hypothesized a positive relationship between organizational performance and slack. According to their theory, slack grows in organizations that are performing well, thereby preventing an excessive upward rise in aspiration levels. But during adversity, slack decreases and aspiration levels are maintained. Thus, slack serves to stabilize aspiration levels and absorb fluctuations in environments.

This view of slack seems to be a natural explanation for the "dominance of efficiency" concerns (Staw et al., 1981: 515) during crises that lead to

reduction of slack. Universities undergoing budget cutbacks also exhibit this tendency (Rubin, 1977). This suggests,

Hypothesis 2: Organizational performance has a positive relationship with slack in organizations: poorly performing organizations have lower slack than organizations that are performing well.

A review of the concept of slack and its use in theories (Bourgeois, 1981; Singh, 1983: 37-49) revealed that it has been used in two quite different ways. Unabsorbed slack corresponds to excess, uncommitted liquid resources in organizations. Whereas some studies have used this definition, another useful way to conceptualize slack is as absorbed slack, which corresponds to excess costs in organizations.⁴ An a priori theory about the differential effects of the two slack components is lacking, so Hypothesis 2 is proposed to apply to both kinds of slack.

Slack and Risk Taking in Organizational Decisions

Some findings from research on innovation suggest a relationship between slack and risk taking. Individual variations exist, but the general argument is that the presence of slack facilitates innovation. From a psychological viewpoint, innovation is more likely in the presence of slack because it buffers organizations from downside risk, and because the legitimacy of experimenting is less likely to be questioned (Thompson, 1969). There is some support in the literature for this assertion (Mohr, 1969). This suggests,

Hypothesis 3: Organizational slack, both absorbed and unabsorbed, has a positive relationship with risk taking in organizations: organizations with more slack engage in greater risk taking than organizations with less slack.

Performance and Decentralization

The literature has repeatedly noted that organizations respond to declining performance by tightening control (Burns & Stalker, 1961; Smart & Vertinsky, 1977). One major aspect of such tightening is increased centralization of authority. Staw and colleagues (1981) proposed that one important effect of threat is a concern for enhancement of control and coordination that is reflected in greater centralization (cf. Perrow, 1982). Thus,

Hypothesis 4: Performance has a positive relationship with decentralization of decision making: poorly performing organizations are more centralized than organizations that are performing well.

Slack and Decentralization

As noted by Staw and his colleagues (1981: 513-516), two predominant effects of declining performance in organizations are the tightening of con-

⁴ Williamson (1964) first discussed the notion of absorption of slack within organizations as excess costs, staff, and salaries.

trol and the dominance of concerns about efficiency. In the present framework, these translate into increased centralization and reduced slack. These are two conceptually distinct processes, but the relationship between decentralization and slack provides the link between them. Some evidence for the relationship between slack and decentralization comes from the effect of competitive pressure on decentralization. Pfeffer and Leblebici (1973) found that organizations facing competitive pressure tend to develop tightly controlled structures with much review and control of decision making. Pfeffer (1978) pointed out that this increasing centralization may be understood better through the mediating influence of slack. As competitive pressure increases, slack in organizations decreases, and this leads to the tightening of control and centralization (1978: 128-129). This suggests,

Hypothesis 5: Organizational slack, both absorbed and unabsorbed, has a positive relationship with decentralization of decision making: organizations with greater slack are more decentralized than organizations with less slack.

Decentralization and Risk Taking

On the basis of her case study of a major corporation, Kanter (1977) proposed that jobs near the tops of organizations are relatively unstructured, tasks are nonroutine, and a variety of unknown elements figure in the decision making. This makes for increasing reliance on trust through homosocial reproduction, the selection of incumbents on the basis of social similarity. Top-level decision makers are, therefore, less likely to differ in their goals and values than lower level decision makers.⁵ A high degree of decentralization implies high involvement of lower level decision makers, with their more diverse goals and values, in the process of decision. This increases unpredictability of the outcomes of decisions; these outcomes have higher variance. Previous research has argued that, at the system-wide level, organizations need to strike a balance between sensible processes of change and elements of "foolishness" (March, 1976: 75) that are difficult to justify locally but are essential for a whole system (March, 1978, 1981; Weick, 1979). In this context, decentralized decision making increases the input of varied goals and values into decision making behavior and can essentially be seen as permitting foolishness to occur in organizations. This suggests,

Hypothesis 6: Decentralization of decision making has a positive relationship with risk taking in organizational decisions: more decentralized organizations engage in more risk taking than less decentralized organizations.

These six hypotheses constitute the primary theoretical model. But in order to correct for possible specification errors, it is necessary to include control variables in the model. These control variables play a methodological rather than a theoretical role in the model.

⁵ The gradual screening out of deviants in organizations as individuals move through promotions produces a similar result if screening is done on the basis of values and goals. The difference is not a substantive problem addressed here.

Control Variables

Structural contingencies theory (Child, 1972; Galbraith, 1977) was the source of three control variables. The effects of (1) organizational size (Blau & Schoenherr, 1971; Pugh, Hickson, & Hinings, 1969), (2) environmental turbulence (Burns & Stalker, 1961; Khandwalla, 1976; Lawrence & Lorsch, 1969), and (3) mass output orientation of operations technology (Khandwalla, 1974; Marsh & Mannari, 1981) on decentralization of decision making were controlled. Although previous empirical results have been conflicting, there is some support for the position that organizations that are large, face more turbulent environments, and have a higher mass output orientation tend to be more decentralized (Scott, 1981).

In addition, the effects of overall competitive pressure on slack and performance were also controlled. As stated in the section on slack and decentralization, earlier research has suggested that competitive pressure has a negative effect on slack (Pfeffer, 1978; Pfeffer & Leblebici, 1973). Strong competitive pressure is an external constraint on organizations and demands greater efficiency of them. Conversely, organizations facing low competitive pressure can afford to pay less attention to efficiency.⁶ Competitive pressure may also affect organizational performance. Organizations may face competitive pressure from several sources, such as price competition, competition for raw materials, and competition for labor. Through reduction of the prices of outputs and increases in prices of raw materials and the costs of labor, the combined effect of these competitive pressures would be to reduce organizational performance.

Figure 2 presents the structural model incorporating all the research hypotheses of theoretical interest and the control variables. As is the usual convention in structural modeling, all theoretical variables are represented as ovals and their observed measures are represented as boxes. The model is fully recursive. It suggests that the total effect of performance on risk taking is composed of one direct negative effect and several indirect positive effects.

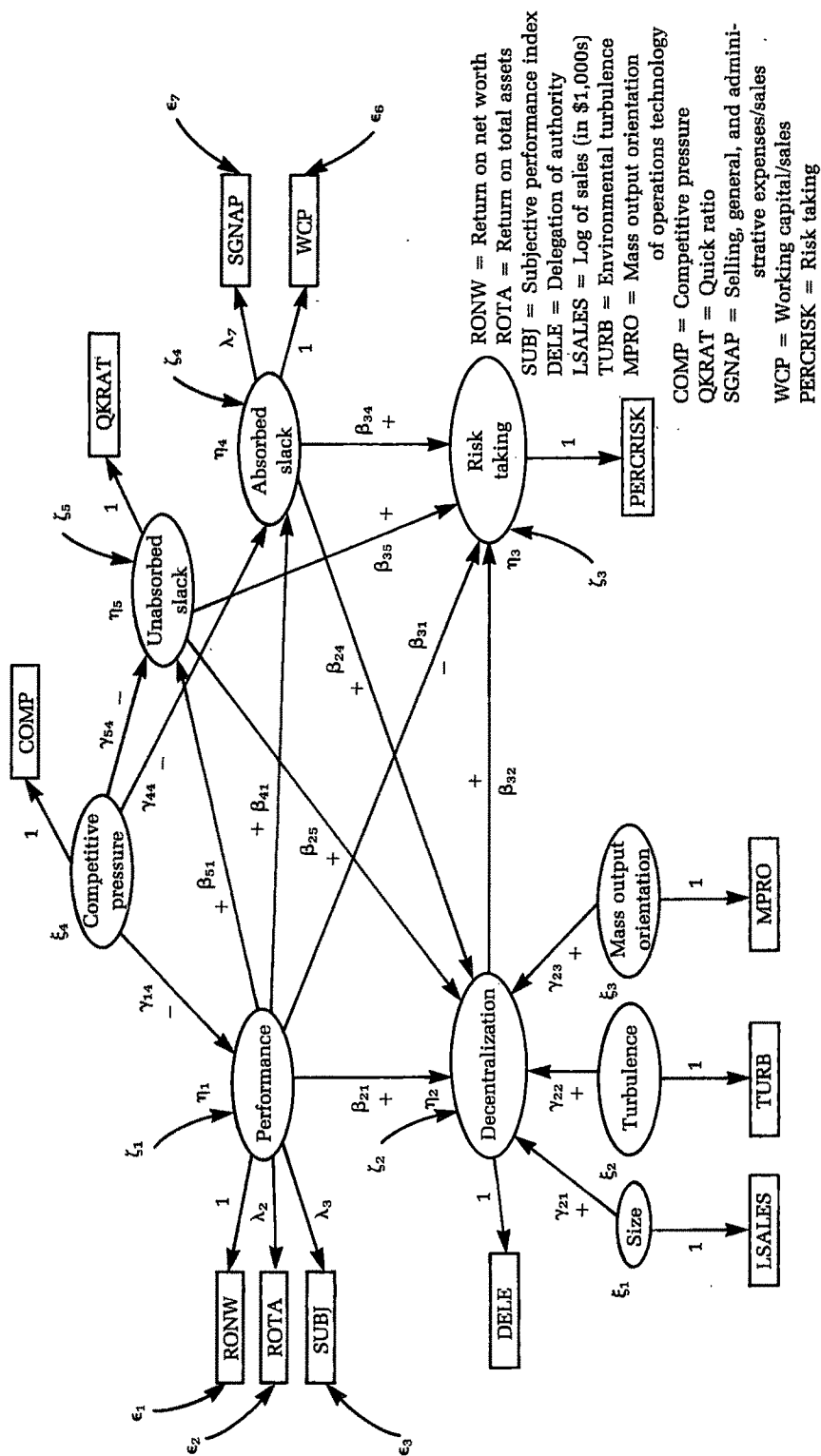
METHODOLOGY

Research Design

The main considerations affecting the choice of research design for this study were appropriateness to the research questions and the availability of data. The proposed model uses static rather than dynamic arguments, although the theoretical arguments are not inherently static and could be modeled dynamically. Thus, a cross-sectional design seemed appropriate. One reason for proposing a static rather than a dynamic model was that

⁶ Similar notions exist in the literature on industrial organization. The concept of absorbed slack proposed here is akin to the economic notion of X-inefficiency (Leibenstein, 1976). In the neoclassical economics framework, organizations are more X-efficient in competitive markets because competitive pressure forces managers to reduce internal slack (Primeaux, 1977; Shepherd, 1979).

FIGURE 2
Structural Model with Measures of Latent Variables



cross-sectional data are considerably less expensive to collect than longitudinal data, particularly when questionnaire measures are involved.

Data

Responses to a questionnaire and publicly available archival sources provided data. Khandwalla (1976, 1981) collected data on decentralization, risk taking, environmental turbulence, mass output orientation of operations technology, and competitive pressure during the period 1973-75 from multiple informants in the top management groups of a cross-sectional sample of organizations. In most cases, there were three or more informants per organization. Khandwalla mailed questionnaires to a random sample of about 500 U.S. and Canadian corporations. Out of the organizations contacted, 173 agreed to participate—112 Canadian and 61 U.S. firms. But the data for 92 Canadian firms and 7 U.S. firms could not be used in the present study because archival financial data on slack were not available owing to procedural differences in financial reporting. This resulted in a final nonrandom group of 64 medium to large U.S. and Canadian corporations. Although the nonrandom selection of the corporations included limits the generalizability of the findings, exploratory data analysis indicated that, as a group, they showed good variation on size, profitability, and the other archival and questionnaire measures.

These corporations belonged to several different industries; airlines, railroads, pharmaceutical manufacturers, and mining firms were examples. The use of the heterogeneous group of organizations was considered appropriate for two reasons. First, since organizations in some industries may not have the predicted relationship between performance and risk taking, using a heterogeneous sample biases the results conservatively. Second, prior research has shown consistently that the negative relationship between performance and risk holds across many diverse industries (Bowman, 1980; Treacy, 1980).

Archival data for the other variables in the model—performance, size, unabsorbed slack, and absorbed slack—were collected for the 1973-75 period. Sources were *Moody's Industrial, Transportation, Public Utility, and OTC Industrial Manuals* (Moody's Investors Service, 1974, 1975, 1976).

Operational Measures

Given the problems associated with using questionnaires (Salancik & Pfeffer, 1977), it was particularly necessary to ensure the methodological adequacy of the questionnaire-based measures by examining their reliability and validity. Table 1 gives the reliability (coefficient of reproducibility) estimates of these measures. It also gives correlations between the responses of multiple informants, an indicator of convergent validity, because the informants serve as multiple measures of the underlying constructs. Complete details of all questionnaire-based measures and their psychometric properties are available in Appendix A of Khandwalla (1976). All the measures tap several dimensions and have broad sets of referents.

The general approach used in this research was to develop multiple measures wherever possible (cf. Webb, Campbell, Schwartz, & Seechrest, 1966; Webb & Weick, 1979). The procedure for data analysis used here, LISREL V (Jöreskog & Sörbom, 1981), makes it possible to estimate measurement errors in variables if multiple measures are used and also provides a statistic for the overall goodness of fit of a model to data. Additionally, this procedure indicates whether multiple measures have convergent validity in terms of loading significantly on corresponding underlying constructs.

Questionnaire measures employed scales of four to eight items. To arrive at an organization's score for each scale, ratings were first aggregated over multiple items and then averaged over informants to increase reliability. All questionnaire items had 7-point response formats.

Organizational performance. Two separate aspects of performance were of interest here: organizations' profit performance and the subjective estimates of their top executives about organizational performance. Two accounting-based performance measures were used: the after-tax return on net worth and the after-tax return on total assets. A 5-item scale measured executives' subjective estimates about organizational performance; the scale asked them to rate how well their organizations were performing relative to competitors on profitability, employee satisfaction, public image, and goodwill. As shown in Table 1, the reliability of this questionnaire instrument was 0.84,⁷ and the correlation between responses of multiple informants was 0.59 ($p < .001$).

TABLE 1
Reliability and Validity of Questionnaire-Based Measures^a

Measures	Reliability or Reproducibility ^b	Convergent Validity ^c
Subjective performance index	0.84	0.59***
Delegation of authority	0.81	0.55***
Environmental turbulence	0.58	0.50***
Mass output orientation of operations technology	— ^d	0.28*
Competitive pressure	0.56	0.61***
Risk taking	0.53	0.58***

^a Based upon Khandwalla (1976: 658–663).

^b For multi-item variables, reliability or reproducibility was measured by the formula: $r_{kk} = k_{ij}/1 + (k-1)r_{ij}$, where r_{kk} = reliability or reproducibility of measure, k = number of items in the measure, and r_{ij} = the average correlation among the items.

^c Correlation between responses of multiple informants.

^d Construction of the measure for mass output orientation was not based on the domain sampling model, so scale items are not expected to be correlated.

* $p < .05$, one-tailed test.

** $p < .01$, one-tailed test.

*** $p < .001$, one-tailed test.

⁷ Nunnally (1967: 226) pointed out that in the initial stages of research, reliabilities above 0.50 are adequate.

Decentralization of decision making. Usually, decentralization is considered as a property of an organization as a whole. But a narrower view was taken here, particularly because examining decisions made by top executives in the organization was of primary interest. Thus, in this research decentralization refers to the extent to which the chief executive of an organization delegated decision making authority in key areas to other top executives. An 8-item scale measured the extent of this delegation of authority; it asked executives to rate the extent of their delegated authority in key decision areas such as acquisitions, selection of large new investments, and raising long-term capital. The reliability coefficient of this delegation measure was 0.81 and the correlation between the responses of multiple informants was 0.55 ($p < .001$).

Organizational slack. Bourgeois (1981) recently made the case for financially derived measures of slack, and Bourgeois and Singh (1983) proposed a slack concept with three components based on financially derived measures of slack. Somewhat analogously, slack was measured here using financial data from annual reports. A two-component concept of slack was proposed that made the distinction between absorbed slack, referring to slack absorbed as costs in organizations, and unabsorbed slack, referring to uncommitted liquid resources. Absorbed slack was measured by the levels of selling, general, and administrative expenses and working capital, after correcting for the volume of transactions as measured by sales in thousands of dollars. The ratio of selling, general, and administrative expenses to sales captures slack absorbed in salaries, overhead expenses, and various other administrative costs; and the ratio of working capital to sales captures absorption of slack related to capital utilization. Unabsorbed slack was measured by the extent to which the sum of cash and marketable securities for the year covered current liability obligations, thus giving the amount of liquid resources uncommitted to liabilities in the near future.

Risk taking in organizational decisions. Risk taking was measured by a questionnaire measure using a 6-item scale. This scale asked top executives to rate how much their organizations were oriented towards risk taking as demonstrated by decisions such as reliance on innovation, debt-financing, heavy R&D, and high risk-high return investments as opposed to low risk-moderate return investments. The reliability coefficient of this measure was 0.53 and the correlation between the responses of multiple informants was 0.58 ($p < .001$).

Size. The literature has used a variety of definitions of size (Scott, 1981), but three that appear often are (1) the natural logarithms of sales volume (in thousands of dollars), (2) net assets (in thousands of dollars), and (3) the number of employees in an organization. *Moody's Manuals* provide data for all three measures. Even though each measure captures a somewhat different aspect of size, empirical investigation showed that they were highly correlated for this sample (0.85 and above), so the use of any one of them was justified. This research used natural logarithm of sales volume as the measure of size.

Environmental turbulence. Environmental turbulence refers to the extent to which the environment of an organization is rapidly changing, unstable, and unpredictable (Emery & Trist, 1965). Turbulence was measured by a 4-item scale that asked top executives to rate how much the environments of their organizations were rapidly changing, unstable, and unpredictable. The reliability coefficient of the measure was 0.58 and the correlation between the responses of multiple informants was 0.50 ($p < .001$).

Mass output orientation of operations technology. The specific dimension of technology that was of interest here was the mass output orientation of the organization's operations technology (Khandwalla, 1974; Marsh & Mannari, 1981). Unlike other measures of technology that assume organizations use only one kind of technology (e.g., Perrow, 1967), a strong point of this measure is that it allows for the possibility that one organization may use multiple technologies. Mass output orientation was measured by a 5-item scale that asked top executives to rate the extent to which their organizations used custom, small batch, large batch, mass production, and continuous process technologies. To get an overall organizational score for this scale, ratings on these five items were given weights of 1, 2, 3, 4, and 5 respectively, before being aggregated. Because the instrument was not constructed on the basis of the domain-sampling model (Nunnally, 1967), the scale items were not expected to be correlated and calculating the reliability coefficient was not meaningful. The correlation between responses of multiple informants was 0.28 ($p < .05$). Although significant, this is not a large correlation. However, Marsh and Mannari (1981) found that this measure of mass output orientation correlated significantly ($r = 0.37$, $p < .01$) with an automaticity measure of technology (Amber & Amber, 1962) for 50 Japanese factories. On this basis, the measure was considered to have adequate convergent validity.

Competitive pressure. Competitive pressure was measured by a 5-item scale that asked top executives to rate the intensity of the competitive pressure in their industries for factors such as purchase of inputs, manpower, marketing, and pricing of outputs. Respondents also rated the importance of each form of competitive pressure represented by an item for the long-term profitability and growth of the organization. These two ratings were multiplied and their square root taken to arrive at a score for the competitive pressure due to each factor. The reliability coefficient of this measure was 0.56 and the correlation between responses of multiple informants was 0.61 ($p < .001$).

Since the questionnaire-based data were collected continuously during the period 1973-75, and the data from archival sources were available annually, the archival data for 1973, 1974, and 1975 were averaged. Thus, the data set consisted of the questionnaire data and the averaged archival data for the three years.

Table 2 shows summary statistics for the questionnaire data and the averaged archival data. Table 3 gives an intercorrelation matrix for measured variables.

TABLE 2
Questionnaire and Averaged Archival Data: Summary Statistics

Variables	Means	Standard Deviations	Minimum	Maximum
Return on net worth (after tax)	17.72	33.93	-228.73	56.19
Return on total assets (after tax)	9.76	6.89	-14.56	27.66
Subjective performance index	24.71	4.63	13.00	34.00
Delegation of authority	33.12	8.18	10.00	50.00
Log of sales (in \$1,000s)	12.31	1.42	9.36	14.96
Environmental turbulence	16.17	3.49	9.00	25.00
Mass output orientation	52.53	16.84	15.00	90.00
Competitive pressure	13.50	4.18	3.00	21.00
S G & A ^a expenses/sales ratio	16.72	9.97	2.25	37.97
Working capital/sales ratio	14.84	18.41	-39.70	55.56
Quick ratio ^b	29.23	41.60	0.56	288.97
Risk taking	-24.73	5.22	-37.00	-12.00

^a Selling, general, and administrative.

^b (Cash + marketable securities)/current liabilities.

DATA ANALYSIS

The structural model in Figure 2 can be represented by a system of five linear structural equations, one corresponding to each endogenous variable in the model. The structural model, expressing the endogenous variables η as functions of (1) the exogenous variables ξ , (2) the endogenous variables, and (3) the error variables ζ , is given by:

$$\eta = \beta\eta + \Gamma\xi + \zeta$$

The measurement model expresses the observed measures y and x as functions of the latent variables η and ξ , respectively, and of random measurement error. It is given by:

$$y = \Lambda_y\eta + \epsilon$$

and

$$x = \Lambda_x\xi + \delta$$

The data were analyzed using a procedure of general maximum likelihood, LISREL V (Jöreskog & Sörbom, 1981), which can be used to estimate the unknown parameters of a system of linear structural equations. The variables in the system can either be directly observed variables or latent variables related to observed variables. This procedure is particularly designed to handle models with latent variables and measurement errors. There are two parts to the procedure, the measurement model and the structural equation model. The measurement model specifies how the unobserved

TABLE 3
Correlation Matrix for All Measured Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Return on net worth	1.00											
2. Return on total assets	.66***	1.00										
3. Subjective performance index	.31***	.48***	1.00									
4. Delegation of authority	.03	.10	.23**	1.00								
5. Risk taking	-.28**	-.14	-.14	.02	1.00							
6. Working capital/sales	.11	.41***	.17*	-.18*	.05	1.00						
7. SG & A ^a expenses/sales	.12	.23**	.04	.05	.28**	.26**	1.00					
8. Quick ratio	.09	.38***	.14	-.15	-.11	.38***	-.04	1.00				
9. Log of sales (in \$1,000s)	.01	.02	-.15	.09	.02	-.19*	.00	-.09	1.00			
10. Environmental turbulence	-.14	-.10	-.10	.12	.09	.01	-.06	.17*	.04	1.00		
11. Mass output orientation	-.15	-.01	.06	.27**	.11	-.15	-.26**	.22**	-.11	.28**	-1.00	
12. Competitive pressure	-.08	-.08	.20*	-.21**	.27**	.43***	.25**	-.02	.02	-.10	-.10	1.00

^a Selling, general, and administrative.

* $p < .10$

** $p < .05$

*** $p < .01$

latent variables are related to the observed variables, and the structural equation model specifies how the latent variables are causally related to each other.

There are two parts to the evaluation of models using LISREL V: (1) the tests of parameter estimates, and (2) the assessment of the overall fit of the model to the data. The procedure for maximum likelihood estimation provides standard errors for the estimates of parameters, and a critical ratio (estimate/standard error) greater than 2 is normally taken to be significantly different from 0 (Jöreskog & Sörbom, 1981: III 12). The overall fit of the model to the data is tested by a chi-square goodness-of-fit test, with smaller chi-square values corresponding to better fits. This provides a test of the model against the alternative hypothesis of arbitrary correlation among the variables. A *p*-level greater than 0.05 is taken to indicate an adequate fit of the model to the data (Jöreskog & Sörbom).

RESULTS

Figure 2 shows the structural model for which the parameters were estimated. Multiple measures were used for the constructs of performance and absorbed slack; all other constructs had single measures, that is, they were assumed to be measured without measurement error. If we assume the measures of performance and slack have uncorrelated errors, the results showed that the model did not fit the data ($\chi^2 = 61.12$ with 40 *df*, *p* = 0.017), because the *p*-level should be greater than 0.05 for an adequate fit (Jöreskog & Sörbom, 1981). However, although the overall model fitted the data poorly, several structural parameter estimates were in the predicted direction and significant. Further, an examination of the maximum modification indices generated by the program—a diagnostic tool that indicates which constrained parameter in the model may be relaxed in order to improve the fit of the model—indicated that the fit of the initial model could be improved by correlating measurement errors. Relaxing a previously constrained parameter and specifying the model more accurately brings the chi-square value for the model down by at least the value of the maximum modification index.

Using a procedure that involves correlating measurement errors is sensible when there are prior theoretical reasons for anticipating correlated measurement errors (Jöreskog & Sörbom, 1981). Correlating measurement errors in this way has the effect of correcting specification errors in the model. In the present case, the two measures of absorbed slack had sales as the divisor, and the performance measures had net worth and total assets as divisors. Thus, it seemed reasonable a priori to expect their measurement errors to be correlated with each other. The model with correlated error covariances fit the data much better. Correlating three errors between measures of performance and absorbed slack made the revised model fit the data quite adequately. For the revised model, the chi-square value for 37 *df* was 42.41 (*p* = 0.249), indicating a good fit. The critical ratios for the error covariances indicated that they were all significant.

Table 4 presents the maximum likelihood parameter estimates and their critical ratios (parameter estimate/standard error). The first two columns show the parameters and their hypothesized directions. The next three columns present the unstandardized and standardized parameter estimates and the corresponding critical ratios.

In Table 4, the β coefficients are the theoretical structural parameters; the γ coefficients are the effects of the control variables; and the λ coefficients are the factor loadings of the observed variables on the latent constructs. Of the nine hypotheses that constituted the main structural model (all the β s), six are significant, with critical ratios above 2. The relationship of absorbed slack with decentralization (β_{24}), the relationship of decentralization with risk taking (β_{32}), and the relationship of unabsorbed slack with risk taking (β_{35}) are all insignificant, although β_{32} is in the predicted direction. Of the six significant parameters, the relationship of unabsorbed slack with decentralization (β_{25}) is not in the predicted direction. The other five significant parameters are all in the predicted direction. These five are the relationship of performance with decentralization (β_{21}); the relationship of performance with risk taking (β_{31}), the main research hypothesis; the relationships of performance with absorbed and unabsorbed slack (β_{41} and β_{51}); and the relationship of absorbed slack with risk taking (β_{34}).

TABLE 4
Parameter Estimates^a

Parameters	Hypothesized Signs	Unstandardized Parameter Estimates	Standardized Parameter Estimates	Critical Ratios
β_{21}	+	0.647*	0.341*	2.502
β_{24}	+	-0.500	-0.322	-1.865
β_{25}	+	-0.295*	-0.285*	-2.691
β_{31}	-	-1.413*	-0.773*	-2.390
β_{32}	+	0.213	0.221	1.535
β_{34}	+	0.893*	0.598*	2.471
β_{35}	+	0.092	0.092	0.627
β_{41}	+	0.575*	0.470*	3.316
β_{51}	+	0.627*	0.343*	3.200
γ_{14}	-	0.043	0.079	0.782
γ_{21}	+	0.109	0.106	1.005
γ_{22}	+	0.135	0.130	1.194
γ_{23}	+	0.266*	0.257*	2.336
γ_{44}	-	0.413*	0.620*	4.147
γ_{54}	-	-0.007	-0.007	-0.063
λ_2	+	2.236*	2.236*	3.403
λ_3	+	0.682*	0.682*	3.474
λ_7	+	0.543*	0.543*	2.605

Coefficient of determination for all structural equations = 0.586

^a Model with correlated measurement errors.

*Parameter estimate/standard error (critical ratio) > 2.

Of the six effects related to the control variables (all the γ s), only two are significant, and of these two, only mass output orientation of operations technology has the anticipated positive relationship with decentralization (γ_{23}). Contrary to expectations, competitive pressure has a positive relationship with absorbed slack (γ_{44}). All the other relationships with the control variables are insignificant.

All the factor loadings of observed variables on latent variables (λ_2 , λ_3 , and λ_7) are significant and in the predicted directions. This shows that the multiple measures of constructs covaried as expected, indicating convergent validity for performance and absorbed slack.

The magnitudes of the relationships may be compared by examining the standardized parameter estimates of all the causal parameters. As may have been expected, the causal parameters that were not significant as compared to their standard errors in the unstandardized solution have quite small standardized estimates. On the other hand, the causal parameters that were significant in the unstandardized solution have stronger effects. The strongest significant relationship is for β_{31} , the relationship of performance with risk taking (-0.773). The magnitudes of the standardized coefficients for the other structural parameters of theoretical interest (β s) are in the range of 0.285 (for β_{25}) to 0.598 (for β_{34}). Of the control variables, the relationship of mass output orientation with decentralization is relatively small ($\gamma_{23} = 0.257$) compared to the relationship of competitive pressure with absorbed slack, which is three times as large ($\gamma_{44} = 0.620$).

The coefficient of determination for the structural equations is 0.586, indicating that the model accounts for a substantial amount of the variance in the variables being studied.

Finally, comparative model-testing was done using chi-square difference tests in order to strengthen confidence in the earlier results. The literature on causal modeling has criticized the use of chi-square values as measures of goodness of fit because these values are sensitive to sample size (Bentler & Bonett, 1980). One way to avoid this problem is to do comparative model-testing using chi-square difference tests (Bentler & Bonett; Jöreskog & Sörbom, 1981). This was particularly appropriate in this study since the initial model did not adequately fit the data. The procedure used involved dropping all the significant structural parameters from the model one at a time and comparing the drop in chi-square to the one degree of freedom gained. A drop in chi-square larger than the critical value (3.841 at $p = .05$) shows that the excluded parameter indeed belongs to the model.

Table 5 reports the results of comparative model-testing. From the baseline model, the significant structural parameters were dropped one at a time, and the fit of the reduced model to the data was examined. The last two columns give the chi-square differences between the baseline model and the reduced model and the corresponding levels of significance. These results demonstrated convincingly that all the significant parameters belonged in the model, because all the chi-square differences were significant ($p < .05$ or

better). This increased confidence in the significance of the parameter estimates reported earlier in this section.

DISCUSSION

The data support the main thesis of this study—that poor performance is related to high risk taking in organizational decisions and good performance is related to low risk taking. Good performance is also related to high absorbed and unabsorbed slack. Absorbed slack is related to increased risk taking as predicted, but unabsorbed slack does not have a relationship with risk taking. These findings indicate that performance has both direct and indirect relationships with risk taking. The direct relationship entails reduced risk taking when performance is satisfactory and increased risk taking when performance is not satisfactory. The indirect relationship, which is mediated by absorbed slack but not by unabsorbed slack, is that better performance is related to increased absorbed slack, which is in turn related to greater risk taking. The absence of an indirect relationship mediated by unabsorbed slack indicates that unabsorbed slack plays a role different from absorbed slack in risk taking. This reinforces the utility of the conceptual distinction made between the two. One explanation of this may be that absorbed slack, which is already assimilated into an organization's design as costs, plays a psychological role in encouraging risk taking that unabsorbed slack, consisting of liquid resources not yet assimilated into an organization, does not.

The findings also support the hypothesis that poor performance reduces decentralization and good performance increases it, consistent with theories that predict centralization as a response to poor performance. However, an interesting departure from predictions is that high absorbed slack reduces decentralization. One plausible explanation of this finding is that high slack in organizations leads to greater political activity (Bourgeois & Singh, 1983), and organizations respond by greater centralization of decisions. Another possibility needing further investigation is that this study's measure of decentralization, which concentrates on the top management team, may

TABLE 5
Comparative Model Testing

Model Specifications	χ^2	df	p	Differences ^a in χ^2	p
Baseline model	42.41	37	0.249		
Drop β_{21}	50.03	38	0.092	7.62	.01
Drop β_{25}	48.74	38	0.114	6.33	.05
Drop β_{31}	52.19	38	0.062	9.78	.01
Drop β_{34}	51.29	38	0.073	8.88	.01
Drop β_{41}	59.12	38	0.016	16.71	.01
Drop β_{51}	56.04	38	0.030	13.63	.01
Drop γ_{23}	47.15	38	0.147	4.74	.05
Drop γ_{44}	65.45	38	0.004	23.04	.01

^a Critical chi-square values (1 df): 3.841 for $p < .05$, 6.635 for $p < .01$.

account for this result. Although high absorbed slack may be related to centralization in top management, it may be related to decentralization at lower levels. The findings do not strongly support the predicted positive relationship between decentralization and risk taking although the relationship is in the right direction, indicating weak support for the prediction.

The parameters included in the model for control purposes figure in only two significant relationships. These are (1) the relationship between mass output orientation of operations technology and decentralization, and (2) that between competitive pressure and absorbed slack. The positive relationship of mass output orientation with decentralization adds some further supportive evidence to some recent findings on the relationship between technology and structure (Marsh & Mannari, 1981). But the strong positive relationship of competitive pressure with absorbed slack is intriguing, since most previous theory would indicate that intense competition pushes organizations to become more efficient. One possible explanation of this finding that future research could investigate is that organizations facing much competitive pressure incur high costs for the information-gathering and control systems they used to monitor competitors. These excess monitoring costs would represent a strategic and adaptive response by organizations to the competitive pressures they face.

Limitations and Some Further Suggestions for Research

Finally, this research has several limitations that future research should address. First, the lack of longitudinal data implies that the temporal ordering of variables cannot be clearly established. This limitation of the data permitted only a test of a static model, although the theoretical arguments could also be made dynamically. An important direction future research might follow would be to test such a dynamic model with longitudinal data and run lagged models to make stronger inferences about causal relationships among variables. Second, this research mixed data from industries because they were the best data available at the time. Although, as discussed in the introductory section, the use of a heterogeneous sample biases results conservatively, future research should see if the findings hold in various industries. Bowman's (1980, 1982) findings suggest that this may be the case. Third, because Khandwalla (1981) collected only one set of questionnaire data on the sampled organizations during the 1973-75 period, and it was not possible to specify which of the three years the data were from, averaged archival data were used for the other variables. This weakens the findings of the study. Fourth, a final limitation may arise because data were gathered during the 1973-75 period of recession. It is possible that the relationships of the variables may be structurally altered because of the recession, which points to the need for testing the model during other periods. On the other hand, more firms perform poorly during recessions, which would increase risk taking if the model is true and thus increase variance in the variables — a desirable feature in any study.

Despite these limitations, the findings of this research suggest some support for the claim that the apparently contradictory and unresolved findings on organizational responses to decline, organizational innovation, and risk and return may be understood better when viewed as a system of direct and indirect relationships. Some of the contradictions existed because previous research tended to examine different parts of the system of relationships. Overall, the data supported the model, although some specific hypotheses were not supported.

Some speculations may be made about this study's broad implications for organizational research. First, some theorists argue that change in organizations results from stable processes of action (March, 1981) and that theories of change are variations on theories of ordinary action in organizations. The theoretical model proposed in this research is based on a relatively simple aspiration-level argument and predicts that poor performance triggers risk taking. It thus provides an example of such a process. Second, and related to the previous observation, the organizational processes that drive risk taking can further inform our understanding of decline in organizations. Future research may study a more general and complex dynamic model in which poor performance leads to high risk taking, and high risk taking makes most such risk takers perform worse in the next period. But a few organizations, for whom the risks pay off, may end up performing quite well. When observed over time for a sample of firms, the emergent pattern would show that most firms, when faced with poor performance, would undertake decisions that would only further their declines (Staw et al., 1981), although some organizations would pull themselves out of crises with large payoffs from risk taking. If supported by data, such a dynamic model would subsume theories predicting that poor performance sets off degenerative cycles that may lead to organizational death as one part of a more general process of adaptation within a system of organizations. Third, recent theories of organization have stressed the role of inertia in organizational change (Freeman & Hannan, 1983; Hannan & Freeman, 1977, 1984) as opposed to adaptation. Most of the time organizations change nonadaptively and inappropriately; consequently, most organizations disappear over time. The general model of risk taking suggested in the preceding speculation makes similar predictions, although one marked difference is its suggestion that adaptive processes of organizational change, not inertia, may sometimes cause the deaths of organizations. If such a model finds empirical support in future research, it would indicate a need for models of organizational change that simultaneously consider adaptive and inertial processes to replace models that consider mainly one or the other.

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RESEARCH NOTES

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INTERPERSONAL AFFECT AND RATING ERRORS

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As long as employers continue to rely on rating instruments to evaluate the performance of employees, the quality of ratings will be of continuing interest to both managers and researchers. What constitutes the quality of ratings is a difficult point, especially when those rated occupy positions that lack objective performance criteria. Assessments of managerial jobs, for example, often yield no observable true scores with which the accuracy of subjective performance ratings can be validated (Lombardo & McCall, 1982; Tsui, 1984a); hence the quality of such ratings is generally assessed in terms of freedom from errors such as leniency, halo effect, and restriction of range (Saal, Downey, & Lahey, 1980). Evaluators presume or interpret ratings high in these errors to be low in accuracy.

Previous research has suggested many sources of rating errors. Landy and Farr (1980) identified four broad classes of variables that have been suspected or proven to undermine the accuracy of performance assessments: (1) roles of raters and ratees, (2) vehicles or rating instruments, (3) contexts of ratings, and (4) rating processes. Campbell, Dunnette, Lawler, and Weick (1970) traced errors in managerial performance ratings to five sources: (1) inadequate sampling of job behavior by raters, (2) raters' expectations and perceptions, (3) changes in ratees' jobs or job environments, (4) actual changes in the job behavior of ratees, and (5) response sets by the raters. Thus, current conceptualizations of sources of rating errors primarily involve cognitive or behavioral variables. An important variable that has eluded researchers exploring rating errors concerns interpersonal relationships between raters and ratees. In particular, how does a rater's affect or feeling toward a ratee influence the quality of ratings?

This research was designed to examine the relationship between interpersonal affect and rating errors. We analyzed ratings by three categories of raters—superiors, subordinates, and peers—and compared them on four criteria of rating errors: leniency, halo effect, range restriction, and degree of

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interrater agreement. We analyzed the errors as a function of raters' affect toward ratees.

BACKGROUND AND HYPOTHESES

Affect—reactions such as like, dislike, preference, evaluation, pleasure, or displeasure—is “the major currency in which social intercourse is transacted” (Zajonc, 1980: 153). Affective reactions, according to Zajonc, are primary, inescapable, and usually irrevocable. Indeed, it would be difficult to dispute the importance of affect in interpersonal relationships.

In organizational psychology, interpersonal affect has taken many different forms and been measured in many different ways. Some forms include friendship (Love, 1981), personal acquaintance (Kingstrom & Mainstone, 1985; Freeberg, 1969), physical attractiveness (Cash, Gillen, & Burns, 1977), and the extent of familiarity between raters and ratees (Jacobs & Kozlowski, 1985). As for performance ratings, affect has been proposed as a source of bias in ratings (Landy & Farr, 1980; Latham & Wexley, 1981), but there have been no direct tests of this proposition in field settings. Nisbett and Wilson (1977) explored rater-ratee liking in a laboratory experiment using videotaped interviews with college instructors as the object of the ratings. Cardy (1982) conducted the first major study investigating the direct effects of affect on performance appraisals. He failed to confirm a direct effect of affect on the accuracy of performance ratings, but his study involved artificial inducement of affect. He concluded that “there is a reason to expect liking to have a greater effect on rating accuracy in ‘real world’ performance appraisals Research directly investigating the effect of liking in applied settings is called for” (1982: 96).

The present research was a field investigation with affect measured rather than artificially induced. We measured affective attitudes of raters toward ratees using the affective bond concept discussed by Kahn, Wolfe, Quinn, Snoek, and Rosenthal (1964) and subsequently operationally defined by Tsui and Gutek (1984). This concept has three components: admiration, respect, and liking. We expected that the nature of raters' affect toward ratees would systematically influence the quality of ratings as measured by leniency, halo effect, range restriction, and interrater agreement. We used these four criteria because we found them to be the criteria most commonly employed in research on rating errors (Saal, Downey, & Lahey, 1980).

Leniency refers to a rater's tendency to give extremely high ratings; severity is the reverse tendency. Previous research has found that different types of raters—individuals themselves, superiors, and peers—differ as to degrees of leniency (Heneman, 1974; Holzbach, 1978; Thomson, 1970; Thornton, 1968). Researchers did not consider direct relationships between affect and leniency in these studies, but indirect evidence that affect influences judgment emerges in research on employee selection. For example, Keenan (1977) found that interviewers' personal feelings toward job applicants influenced their evaluations. He reported a fairly strong relationship

between interviewers' liking of applicants and overall evaluations. We expected to observe a similar effect in performance ratings.

Hypothesis 1: Leniency will be greatest in ratings by raters with positive affect toward ratees and lowest in ratings by raters with negative affect toward ratees.

Halo effect is a rater's tendency to give similar ratings on all performance dimensions for a single ratee. Latham and Wexley (1981) characterized the halo effect as "inappropriate generalizations from one aspect of a person's performance on the job to all aspects of a person's job performance" (1981: 102). Jacobs and Kozlowski (1985) found that halo increases as familiarity between raters and ratees increases. Such familiarity is likely to enhance opportunities for developing strong affective reactions, either positive or negative.

Hypothesis 2: Halo effects will be significantly greater in ratings by raters with extreme positive or extreme negative feelings toward ratees than in ratings by raters with neutral feelings.

Range restriction refers to the degree to which a rater's ratings for different ratees are dispersed. This dispersion phenomenon provides information on how raters differentiate performance levels among ratees. Range restriction is similar, but not identical, to the concept of central tendency, which refers to the clustering of ratings around the midpoint of a given scale. Range restriction assumes a natural midpoint that may or may not coincide with a scale's actual midpoint. Since we expect raters with extreme feelings to give more extreme ratings, their ratings will be further away from a scale's natural midpoint.

Hypothesis 3: Ratings by raters with neutral feelings will show greater range restriction or central tendency around natural midpoints than will ratings by raters with either positive or negative feelings.

Interrater agreement refers to the degree to which two raters agree on the performance level of the same ratee. Lack of interrater agreement has been used to infer error in performance ratings (Jones, Johnson, Butler, & Main, 1983), though some researchers have suggested that there may be legitimate reasons for divergence in ratings between raters (Borman, 1974; Tsui, 1984a). In general, previous work has found interrater agreement in ratings of managerial performance to be low (Tsui & McGregor, 1982). However, previous research has shown higher rates of agreement between raters in the same hierarchical levels than between raters from different levels (Albrecht, Glaser, & Marks, 1964; Gunderson & Nelson, 1966; Kavanagh, McKinney, & Wolins, 1971; Thomson, 1970). Borman (1974) explained such agreement in terms of similarity in criteria used by raters. It seems plausible that interrater agreement or its lack may also reflect other contextual factors such as (1) different aspects of behavior observed by different raters, (2) variations in information available to raters, or (3) the nature of interpersonal relationships between

raters and ratees. Raters at the same hierarchical level may disagree when they have different degrees of liking for ratees.

Hypothesis 4: Interrater agreement will be higher between two raters with similar positive or negative affect toward a ratee than between two raters with different affect—one more positive or more negative than the other.

METHODS

Sample

The initial group of potential ratees consisted of a 10-percent stratified random sample of middle managers whose positions ranged from second-level manager to vice president. All worked for the same nationwide multidivisional corporation. This sampling provided 550 potential ratees. Of the 550 individuals contacted, 344 responded, a response rate of 62.5 percent. Participating in this study as raters were 272 of these managers' superiors, a figure representing a response rate of 79.1 percent; 470 of their peers (88.3% response rate); and 608 of their subordinates (88.4% response rate).

Procedures

A letter of introduction was sent to each manager in the initial sample by the corporation's Vice President for Personnel and Public Affairs. One week later, we sent a packet of questionnaires to each manager along with a memo describing in detail the purpose of the research. The focal managers—the ratees—were asked to distribute rating instruments to one superior, two subordinates, and two peers. To ensure that the raters had ample opportunities to observe the ratees' job behavior, we encouraged managers to select those raters with whom they interacted most regularly on job-related matters. Managers were further asked to select one subordinate and one peer with whom they worked best and one of each with whom they worked least well. This was to ensure some variance in interpersonal affect between raters and ratees.¹ We strongly emphasized the confidential nature of the research. Raters returned the completed questionnaires directly to the first researcher in self-addressed, stamped envelopes.

Measures

Performance was evaluated on ten measures of managerial role behavior and one measure of overall effectiveness. The ten categories of role behavior were based on Mintzberg's (1973) managerial roles. The roles included

¹ This was not an ideal sample selection procedure. Ideally, a researcher, not a focal individual, should select raters. Intuition suggests that our focal managers may have selected raters who would give relatively favorable ratings. This could apply even to individuals focal managers chose as those with whom they worked least well. Such selection would reduce the power of the analysis on the affect variable and diminish the likelihood of finding differences. The results, therefore, would be a more conservative test of differences in rating errors.

representation, leader, liaison, environmental monitor, information disseminator, spokesperson, entrepreneur, crisis handler, resource allocator, and negotiator. A short paragraph describing each role appeared on the questionnaire; these descriptions were developed by Alexander (1979). We asked the respondents to indicate on a 7-point scale the extent to which a manager was effective in performing each of the described roles. The anchors ranged from 1, not at all, to 7, to an extreme extent.

In addition to the ten specific role scales, each rater was asked to respond to three questions on overall effectiveness. We used the expectational effectiveness scale developed by Tsui (1984b). This scale measures the extent to which a rater feels that a ratee's job performance is consistent with the rater's expectations. Internal consistency reliability coefficients for the standardized items on the scale exceeded .80 for all the raters.

To assess degrees of interpersonal liking for manager-ratees, a three-item affective relationship scale was used (Tsui & Gutek, 1984). This scale measures the extent to which a rater admires, respects, and likes a ratee. The internal consistency reliability estimates were .69 for superiors, .83 for subordinates, .78 for peers, and .79 for the total sample of raters. We summed the three items to obtain scores on this scale; scores ranged from 3 to 15.

Leniency was measured using the mean ratings on the 11 performance scales. Range restriction was measured by the standard deviations of the 11 variables. Halo effect was measured through the intercorrelations among the performance variables. Interrater agreement was analyzed by computing the Pearson product-moment correlations on the ratings between two raters.

Analyses

The sample of raters was trichotomized on the basis of scores for affect. We designated raters with affect scores in the highest third as having positive affect. Those in the middle third were classified as having neutral affect, and those in the lowest third were classified as having negative affect. We applied this trichotomization procedure separately to the superiors, subordinates, and peers, and also to the total sample. Mean scores for the three affect groups were similar across the categories. For the total sample, the average score on affect for the group with positive affect was 14.4 (min. = 14, max. = 15); for the negative group it was 9.6 (min. = 3, max. = 11); and for the neutral group it was 12.6 (min. = 12, max. = 13).

The ratings on the 11 performance scales were first subjected to a MANOVA. Then, we tested the ratings for profile parallelism, again using a MANOVA. We computed the average of the 11 variables and performed an ANOVA to test for overall differences in levels. This level test gave information on an overall effect for leniency. The profile parallelism test provided information on the central tendencies of raters across multiple measures for the same ratees. A small *F* value indicated that the rating scores were similar, providing another measure of halo. We estimated the size of the effects of the univariate ANOVA tests using Hay's ω^2 and estimated the size of the effects of the MANOVA tests using Wilks's multivariate η^2 (Green, 1978: 332).

Following a procedure used by other researchers, we used a nonparametric statistic as the primary analytical procedure to assess leniency, halo, and range restriction. Heneman (1974) and Thomson (1970) used the sign test to establish that subjects from two different populations give two sets of scores. The sign test analyzes the probability that one set of scores will be higher than another set in over 50 percent of the cases. However, the sign test does not take into consideration the magnitude of differences between scores. The Wilcoxon matched-pairs, signed-ranks test has the same advantages as the sign test but also takes into account the magnitude of differences (Siegel, 1956: 75-83). Thus, we used the Wilcoxon test to assess overall leniency, halo effect, and range restriction by comparing the scores of each rater to every other rater's. We compared the 11 performance variables listed in Table 1 on their means (for leniency), on their standard deviations (for range restriction), and on their intercorrelations (for halo effect).

Interrater agreement was analyzed for those ratees with two subordinate or two peer raters. If two similar raters had the same scores or differed by less than four points on the 15-point affect scale, they were placed in a similar-affect rater group. Scores could be either high, medium, or low on the scale. If two similar raters' scores differed by more than three points they went into a different-affect rater group. We categorized the subordinates and the peers separately because it was not clear if the effect of affect on agreement would be similar for these two types of raters. After obtaining Pearson correlations on each performance variable, we tested the significance of the difference between the two correlations—one for the raters with similar affect and one for the raters with different affect—using Fisher's r -to- z_r transformation procedure and a z -score calculated on the standardized correlations.

RESULTS

Table 1 summarizes the means, standard deviations, and the mean intercorrelations of the performance ratings.² The MANOVA yielded significant overall F values for all three types of raters, as well as for the total sample. The significant overall value for F derived from the ANOVA supported the hypothesis on leniency. The level of ratings given by raters with positive affect toward ratees was the highest; raters with neutral affect gave the next highest; and the raters with negative affect gave the lowest ratings. The Wilcoxon test corroborated the results of the ANOVA test.

The results of the profile parallelism tests were also significant, suggesting that the spread of scores on the 11 performance variables is different for raters with different levels of affect. The mean intercorrelations were highest for raters with negative affect and lowest for raters with neutral affect. The pattern of halo effects across affect groups was similar for superiors, subordinates, and peers. This result supported the hypothesis that ratings by raters with extreme feelings toward the ratees would contain stronger halo

² The intercorrelation matrices are available from the first author.

TABLE 1
Means, Standard Deviations, and Mean Intercorrelations of Performance Ratings^a

Performance Variables	Superiors ^b			Subordinates			Peers			Total Sample		
	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative
Representation	4.07 (1.61)	3.89 (1.40)	3.34 (1.36)	4.15 (1.55)	3.68 (1.38)	3.54 (1.63)	3.98 (1.79)	3.97 (1.43)	3.46 (1.43)	4.09 (1.63)	3.84 (1.41)	3.47 (1.46)
Leader	5.81 (0.79)	5.24 (0.95)	4.28 (1.04)	5.73 (0.94)	5.10 (0.95)	3.89 (1.13)	5.60 (0.96)	5.04 (0.98)	4.09 (1.14)	5.71 (0.92)	5.11 (0.96)	4.03 (1.12)
Liaison	5.06 (1.05)	4.68 (1.02)	4.08 (1.31)	5.10 (1.28)	4.88 (1.10)	4.33 (1.17)	5.08 (1.29)	5.08 (1.05)	4.27 (1.18)	5.08 (1.24)	4.91 (1.07)	4.27 (1.20)
Environmental monitor	4.60 (1.12)	4.39 (1.05)	3.97 (1.03)	4.84 (1.17)	4.56 (1.13)	4.10 (1.12)	4.76 (1.22)	4.68 (1.09)	4.11 (1.10)	4.77 (1.18)	4.56 (1.10)	4.09 (1.10)
Information disseminator	5.23 (1.05)	4.89 (0.99)	4.42 (1.03)	5.49 (1.04)	5.05 (1.06)	4.34 (1.21)	5.24 (1.08)	5.01 (0.99)	4.39 (1.21)	5.38 (1.05)	4.99 (1.02)	4.36 (1.18)
Spokesperson	4.87 (1.20)	4.51 (1.28)	3.71 (1.35)	5.21 (1.21)	4.80 (1.14)	4.31 (1.15)	5.09 (1.26)	4.75 (1.21)	4.21 (1.19)	5.12 (1.22)	4.71 (1.21)	4.18 (1.21)
Entrepreneur	4.59 (0.92)	4.05 (1.22)	3.32 (1.30)	4.80 (1.33)	4.35 (1.22)	3.73 (1.27)	4.50 (1.46)	4.26 (1.16)	3.62 (1.23)	4.68 (1.31)	4.24 (1.20)	3.62 (1.26)
Crisis handler	5.97 (0.85)	5.29 (0.98)	0.47 (1.20)	5.87 (1.00)	5.39 (1.05)	4.27 (1.23)	5.80 (0.97)	5.32 (1.01)	4.38 (1.30)	5.87 (0.97)	5.34 (1.01)	4.35 (1.25)
Resource allocator	5.36 (1.13)	4.91 (1.04)	4.36 (1.15)	5.21 (1.21)	4.75 (1.22)	4.17 (1.08)	5.19 (0.91)	4.99 (1.01)	4.37 (1.29)	5.23 (1.13)	4.88 (1.11)	4.28 (1.19)
Negotiator	5.23 (1.17)	4.74 (1.17)	3.92 (1.29)	4.88 (1.55)	4.65 (1.20)	4.04 (1.33)	5.07 (1.30)	4.84 (1.24)	4.07 (1.24)	4.99 (1.43)	4.75 (1.21)	4.03 (1.29)

TABLE 1 (continued)

Performance Variables	Superiors ^b			Subordinates			Peers			Total Sample		
	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative
Expectational effectiveness	5.90 (0.63)	5.12 (0.82)	4.04 (0.98)	5.92 (0.79)	5.25 (0.79)	3.85 (1.00)	5.74 (0.84)	5.34 (0.80)	4.28 (1.16)	5.87 (0.78)	5.28 (0.80)	4.05 (1.08)
Mean r	.23	.25	.40	.27	.25	.32	.26	.18	.33	.26	.23	.34
N	70	131	72	220	191	197	101	189	181	391	511	448
Overall MANOVA F		7.99*			27.49*			11.46*			44.34*	
Multivariate η^2		.45			.57			.39			.47	
Profile parallelism												
MANOVA F		2.97*			9.61*			29.80*			13.89*	
Multivariate η^2		.20			.26			.13			.18	
Overall level												
ANOVA F		56.23*			47.76*			89.92*			293.06*	
ω^2		.30			.33			.28			.31	

^a Entries are mean ratings. Standard deviations are in parentheses.^b Positive, neutral, and negative refer to types of affect raters had toward ratees.* $p < .001$

effects than ratings by raters with neutral affect. The Wilcoxon tests supported the results based on the *F* values for profile parallelism derived from the MANOVA.

The raters with neutral affect gave ratings with the most restricted ranges, as hypothesized. The raters with negative affect gave ratings that had the largest dispersion, followed closely by the ratings from the raters with positive affect. In general, the Wilcoxon tests showed that the raters with extreme feelings tended to give more dispersed ratings for different ratees, and the ratings by the neutral-affect raters tended to exhibit a central tendency around the natural midpoint of the scale.

Table 2 summarizes the results of the Wilcoxon tests on leniency, halo effect, and range restriction. The pattern of findings on rating errors as a function of rater's affect toward a ratee was similar for superiors, subordinates, and peers. Although some comparisons did not reach statistical significance, the direction was consistent across types of raters.

Table 3 summarizes the results of the analysis of interrater agreement. Findings were slightly different for subordinates and for peers. Interrater agreement was higher for two subordinates with similar affect toward a ratee-manager than for two subordinates with different affect. Nine of the 11 correlations were significant for the first case, but only one correlation was significant for the second. We found significant differences on three pairs of correlations. Among peers, two raters with similar affect did not agree significantly more than two raters with different affect, though we observed such a

TABLE 2
Results of Wilcoxon Tests on Leniency, Range Restriction, and Halo Effect in Performance Ratings as a Function of Rater's Affect toward Ratee

Raters	Criteria of Rating Errors ^a		
	Leniency	Halo Effect	Range Restriction
Superiors	Positive > neutral Neutral > negative Positive > negative	Positive ≥ neutral Negative > neutral Negative > positive	Neutral ≥ positive Neutral > negative Positive > negative
Subordinates	Positive > neutral Neutral > negative Positive > negative	Positive ≥ neutral Negative > neutral Negative > positive	Neutral > positive Neutral > negative Negative ≥ positive
Peers	Positive > neutral Neutral > negative Positive > negative	Positive > neutral Negative > neutral Negative > positive	Neutral > positive Neutral > negative Negative ≥ positive
Total sample	Positive > neutral Neutral > negative Positive > negative	Positive > neutral Negative > neutral Negative > positive	Neutral ≥ positive Neutral > negative Negative ≥ positive

^a ≥ Designates that the difference is not statistically significant.

tendency. Five of the correlations in the group of raters having similar affect were significant, but only three reached significance in the different-affect group. Further, 7 of the 11 z-scores were in the direction hypothesized. Agreement was higher for raters with similar affect than for raters with different affect. In summary, the hypothesis on the effect of affect on interrater agreement was supported for subordinates and sufficiently supported in the data for peers so that results of the combined sample supported the hypothesis.

DISCUSSION AND CONCLUSIONS

This study demonstrates that a rater's reports of interpersonal affect toward a ratee are systematically related to rating errors as measured by leniency, halo effect, range restriction, and level of interrater agreement.

Ratings by raters with positive affect toward ratees were found to be the most lenient; ratings by raters with negative affect were the least lenient. This finding did not vary by type of rater; we saw the same relationship between affect and leniency for the ratings by superiors, peers, and subordinates. This suggests that feelings or affective reactions toward ratees can potentially influence all raters.

With respect to halo effects, ratings by raters with either definite positive or negative affect toward ratees exhibited significantly more halo than ratings by raters who were more neutral as to affect. Further, we found halo to be significantly greater when raters had negative affect than when raters had positive affect toward ratees. This result is consistent with findings from research on interviewing indicating that employment interviewers weigh negative information more heavily than positive information (Arvey & Campion, 1982). It seems that negative feelings influence raters with negative affect more than positive feelings influence raters with positive affect. This would explain why raters with negative affect have a greater tendency to generalize their feelings across performance dimensions.

Range restriction was found to be highest in ratings by raters with neutral affect; ratings by raters with high or low affect exhibited greater dispersion on the rating scale. This finding suggests that keeping feelings out of an appraisal process may have the undesirable consequence of producing poorly differentiated performance levels among a group of ratees. Future research could more systematically explore the positive function of affect in performance evaluations.

Finally, interrater agreement was found to be higher between two raters with similar affect, whether it was positive, negative, or neutral, than between two raters with different levels of affect. Although this result was not significant for raters who were a ratee's peers, we observed a trend consistent with our hypothesis. Still, affect did not account entirely for the lack of interrater agreement. Much more research is needed to identify factors that may enhance interrater agreement, including cognitive, behavioral, and interpersonal variables. For example, a recent study by Schmitt, Noe, and Gottschalk (1986) found that shared bias measured by demographic variables increased agree-

TABLE 3
Interrater Agreement as a Function of Rater's Affect toward Ratee

Performance Variables	Subordinates			Peers			Combined Sample		
	Similar Affect (N=140)	Different Affect (N=97)	z	Similar Affect (N=108)	Different Affect (N=61)	z	Similar Affect (N=248)	Different Affect (N=158)	z
Representation	.24**	.10	1.08	.30**	.21	0.59	.26**	.14	1.22
Leader	.37***	.11	2.08*	.34**	.24	0.67	.36***	.15	2.20*
Liaison	.22**	.21*	0.08	.17	.33**	-1.04	.20**	.25**	-0.51
Environmental monitor	.04	.13	-0.68	.07	.09	-0.12	.06	.11	-0.49
Information disseminator	.28***	.16	0.95	.19*	-.11	1.84	.24***	.06	1.80
Spokesperson	.21**	.20	0.08	.13	.31*	1.16	.18**	.23**	-0.51
Entrepreneur	.30***	.06	1.87	.10	.04	0.37	.23***	.06	1.70
Crisis handler	.27***	-.04	2.37*	.41**	.20	1.42	.33***	.04	2.95**
Resource allocator	.34***	.18	1.28	.14	.06	0.50	.26***	.13	1.32
Negotiator	.04	.04	0.00	.10	.12	-0.12	.07	.06	0.10
Expectational effectiveness	.49***	.12	3.10**	.39***	.43***	-0.29	.45***	.23**	2.45*

* $p < .05$ ** $p < .01$ *** $p < .001$

ment among self-ratings, ratings by superiors, and ratings by subordinates. Similarity in affect is one form of shared bias.

Our results suggest that affect is a meaningful and important variable in research on performance appraisal, but that more work on the conceptual and operational definition of this construct is needed. We defined affect as interpersonal feelings based on work-related interactions (Kahn et al., 1964). Future research should explore other conceptualizations of affect such as familiarity between rater and ratee, attitudinal similarity, perceived attractiveness of ratees, and perhaps even the stable mood states of raters. Research that considers other criteria of rating quality is also desirable. This research focused on rating errors; it would be useful to investigate the relationship between affect and rating accuracy in jobs where accuracy measures can be obtained. The strength of our findings, in contrast with Cardy's (1982) inability to observe a direct effect in a laboratory setting, suggests that future research should strive for field settings where true variations in affect can be measured.

The results of this study also have important implications for managers. This study provided robust evidence that affect directly influences the quality of performance ratings. Our results underscore the importance of encouraging raters to segregate objective judgments from subjective feelings when evaluating the performance of others. But is this really possible? If affect is in fact inescapable and irrevocable (Zajonc, 1980), can we reasonably expect raters to ignore or set aside their feelings when participating in performance appraisals? Besides, we found that neutral affect actually reduced the quality of rating on one criterion—range restriction. Perhaps organizations should strive not for the suppression of feelings by any one rater but rather for a balance of affect among multiple raters in performance evaluations.

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RELATIONS BETWEEN SITUATIONAL FACTORS AND THE COMPARATIVE REFERENTS USED BY EMPLOYEES

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Research derived from equity theory suggests that employees evaluate specific job facets, such as pay and security, by contrasting their own with those of comparative referents, such as co-workers and personal experiences in other settings (cf. Goodman, 1974; Oldham, Nottenburg, Kassner, Ferris, Fedor, & Masters, 1982; Pritchard, Dunnette, & Jorgenson, 1972). Given the

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importance of comparative referents in the process of evaluating facets, it would be useful to understand the factors that affect individuals' choices of particular referents. Unfortunately, very little research has focused on this topic (Goodman, 1977; Mowday, 1983; Pinder, 1984), and the research that has been conducted has examined only a few factors that might influence choices of referents used in pay evaluations. For example, Goodman (1974) showed that employees with low salary levels compared their pay to the pay of other employees inside their organization. Andrews and Henry (1963) and Goodman (1974) demonstrated that highly educated employees were more likely to compare their pay to that of persons outside their organizations than were employees with relatively little education.

Goodman (1974, 1977) suggested that the results of the two studies just described are generally consistent with his framework of selection of referents. In this framework, choice of referents is a function of both the availability of information about a referent and the relevance or attractiveness of the referent for the comparison. Further, Goodman (1977) suggested that, although the attractiveness of referents is a function of their instrumentality in satisfying needs, situational factors, such as organizational and educational levels, may influence the availability of information about potential referents. Thus, employees at low salary levels appeared to have ready access to information about the pay of others inside their organizations, and highly educated employees appeared to have access to information about the pay of others outside their organizations.

This study focused on the comparative referents employees use when contrasting four job facets: compensation, job complexity, security, and supervision. Previous research has demonstrated that (1) many employees contrast these facets to the facets of comparative referents, and (2) employees react to inequitable treatment with regard to these facets (cf. Dittrich & Carrell, 1979; Oldham, Kulik, Ambrose, Stepina, & Brand, *in press*; Oldham et al., 1982; Telly, French, & Scott, 1971).

The types of comparative referents examined in this study were derived from previous research and theory (Adams, 1963; Goodman, 1974). They were (1) self-inside, an employee's experiences in a different position inside a focal organization; (2) self-outside, an employee's experiences in a situation or position outside a focal organization; (3) other-inside, another individual, or group of individuals inside a focal organization; and (4) other-outside, another individual, or group of individuals outside a focal organization.

For each of the four job facets, we examined associations between use of these comparative referents and several situational factors that figure in Goodman's framework as potentially increasing or decreasing access to information about referents. The situational factors we investigated were organizational tenure, size of department, size of job classification, and job level. Access to a large number of referents inside an organization is expected to be high when job level is low, tenure is long, and department and job classification are large. On the other hand, employees with short tenure should have

access to relatively few referents inside their organization and, therefore, are expected to rely on sources located outside.

METHODS

Setting, Sample, and Procedures

The research was conducted in electronic data processing (EDP) units from 20 departments—education, highway safety, transportation, and others—of a large state government. We randomly selected employees from each of the departments. All of the 265 employees contacted agreed to participate in the study; they represented a variety of jobs, ranging from data entry operators to department heads. The modal education level of participants was a college degree, and 168 of them were men.

Data, collected as part of a larger study of employees' reactions to inequitable conditions in the organization, came from questionnaires, interviews, and archives. They were collected during a three-week period in individual sessions involving one of two doctoral student interviewers and one employee. Participants were first informed that the project focused on how EDP employees felt about their jobs and were assured that their individual responses would be held in confidence. They next completed a questionnaire describing one of their four job facets; the presentation order of the facets was varied in a latin-square design. Participants were then interviewed as to whether they compared their own job facet to that of some referent. Those who indicated that they used a referent for a job-facet comparison were asked to describe that comparative referent. These four steps were then repeated for each of the three remaining facets. On a separate questionnaire, participants provided name, gender, educational level, and organizational tenure. We collected information on departmental size, job level, and size of job classification for each participant from organizational records.

Measures

Descriptions of job facets. For each of the facet measures,¹ we averaged the items composing the measure to form summary indices. For the measure of *job complexity*, participants described the characteristics of their jobs—skill variety, task identity, task significance, autonomy, and feedback—on the Job Diagnostic Survey (Hackman & Oldham, 1975) ($\alpha = .72$). For *supervisory behavior*, they described the behavior of their immediate supervisors using the consideration subscale of the Leader Behavior Description Questionnaire—Form XII (Stogdill, 1963) ($\alpha = .86$). For *compensation*, employees described

¹ The descriptive measures for job complexity, supervisory behavior, compensation, and security were pilot-tested on a sample of 242 nonacademic employees of a midwestern university. We factor-analyzed the items and rotated the factors using oblique rotation. Supervisory behavior, compensation, and security emerged as three distinct factors, each with an eigenvalue greater than 3.60. The job complexity items from the JDS formed five separate factors corresponding to the five job characteristics; eigenvalues associated with the job characteristics were all greater than 1.00. We will provide a detailed description of these results on request.

their pay and fringe benefits on a 10-item scale we developed for this study ($\alpha = .70$). For security, employees described their security in job and organization on a 10-item scale also developed for this study ($\alpha = .87$). Employees rated items assessing compensation and security on 7-point formats ranging from very inaccurate to very accurate. The items composing the compensation and security scales appear in the Appendix.

Use and nature of comparative referents. After they had described a particular job facet on a questionnaire, participants were interviewed concerning their use of referents for that facet. An open-ended, unstructured format enabled them to select freely a referent for each facet. Employees were first asked to consider the facet descriptions they had just completed. Next, to determine if they contrasted a job facet to a referent's to form an evaluation, employees were asked if they ever made comparisons involving this job facet. If they indicated that they did not make comparisons, interviewers introduced the next facet. If employees indicated that they used one or more comparisons, interviewers asked them to identify the comparative referent they used most frequently (i.e., a primary referent) and to elaborate on this comparison. Information provided in this discussion included a description of the referent used for that job facet. This method of assessing comparative referents is compatible with methods used in previous field research (cf. Oldham et al., *in press*; Oldham et al., 1982).

The descriptions provided for each primary referent were later coded according to the four categories of referents described in the introductory section. All interviews were tape recorded, so that a second independent rater could verify employees' use of comparative referents. Agreement between the two raters was 96 percent for job complexity referents, 94 percent for compensation referents, 97 percent for security referents, and 96 percent for supervisory behavior referents. When raters disagreed, tapes were reviewed and an agreement reached about the nature of a referent.

Situational factors. The number of months an employee had worked in the organization served as the measure of tenure. Job level was an employee's level in the formal hierarchy of the organization. Departmental size referred to the total number of employees in an employee's department, and size of job classification was the total number of people within a focal employee's formal job classification in that individual's department. Table 1 shows correlations among the situational factors and descriptions of job facets; 50 percent of the correlations among the situational factors are statistically significant.

Analysis

A general examination of the extent to which employees used facet comparisons preceded our primary analysis, which examined relations between the situational factors and use of the categories of comparative referents. For each of the four job facets, we partitioned employees according to the referent category they used. To test the extent to which these groups

TABLE 1
Descriptive Statistics and Correlations among All Variables

Variables	Means	Ranges	s.d.	1	2	3	4	5	6	7	8
1. Tenure	107.45	1.0-450.0	50.27	—							
2. Job level	20.38	7.0-30.0	4.14	.26**	—						
3. Departmental size	100.52	14.0-275.0	70.45	.18**	.02	—					
4. Size of job classification	7.38	1.0-45.0	5.93	.03	.29**	.06	—				
5. Job complexity	5.57	3.0-7.0	0.67	.14*	.32**	.00	.16*	—			
6. Supervisory behavior	3.65	1.8-5.0	0.61	-.05	-.06	-.12	.14*	.19**	—		
7. Compensation	4.21	2.1-6.4	0.90	.27**	.27**	.10	.08	.17*	.07	—	
8. Security	5.63	2.5-7.0	0.89	.01	.02	.01	-.10	.11	.05	.08	—

* $p < .05$, two-tailed test.

** $p < .01$

could be distinguished on the basis of the situational factors, we used multiple linear discriminant analysis—one analysis for each of the job facets. Since the multicollinearity of discriminant function variables might strongly affect the discriminant weights obtained in this analysis, substantive interpretation of the discriminant functions was based on structure coefficients. These coefficients, which are not affected by relationships with other variables, provide a more accurate insight into the nature of the discriminant functions (Adams, Laker, & Hulin, 1977; Cohen & Cohen, 1983; Klecka, 1980).

RESULTS

Most of the participants (93%; $n = 247$) compared one or more job facets to those of comparative referents, and only these employees are included in the substantive analyses. A closer examination of the data revealed the following: 74 percent ($n = 196$) of the participants compared their compensation to a referent's, 59 percent ($n = 156$) contrasted job complexity, 55 percent ($n = 146$) contrasted supervisory behavior, and 48 percent ($n = 127$) contrasted job security.

For each of the job facets, a discriminant analysis based on referent categories was performed. These analyses included five referent categories, because employees could use any one of the four referent categories or no referent for a given facet. Categories were self-inside, self-outside, other-inside, other-outside, and no referent.² Table 2 shows results of the analyses, which produced one discriminant function significant beyond the .05 level for compensation and two significant functions for job complexity. No significant discriminant functions emerged in analyses involving supervisory behavior or security.

Tenure primarily characterizes the significant function for compensation. An inspection of the group means indicates that employees who used other-inside referents for compensation had the longest organizational tenure, and those who used self-outside compensation referents had shorter tenure. Tenure also primarily composes the first function for job complexity. An inspection of the means indicates that employees with long tenure used other-inside referents for job complexity, and employees with short tenure used self-outside job referents. Finally, the second function for job complexity is characterized primarily by job level and size of job classification. Results suggest that individuals who use other-outside referents are largely upper-echelon employees who work in large job classifications.³

² Analyses were also performed excluding the no-referent group, with results virtually identical to those reported.

³ To supplement these analyses, we performed additional discriminant analyses, using partitions based on an inside-outside dichotomy; the self-inside and other-inside groups were collapsed, as were the self-outside and other-outside groups. The analyses resulted in one significant discriminant function for each of the compensation and job complexity facets. The results paralleled those reported in Table 2. For example, employees with long tenure used inside referents, and employees with short tenure used outside referents. Details are available on request.

TABLE 2
Significant Discriminant Functions
for Analyses by Categories of Referents^a

Situational Factors	Compensation		Job Complexity			
	I		I		II	
	<i>w</i>	<i>r_{xy}</i>	<i>w</i>	<i>r_{xy}</i>	<i>w</i>	<i>r_{xy}</i>
Tenure	1.01	.97	.96	.82	-.13	-.02
Job level	-.15	.14	.14	.31	.87	.67
Departmental size	-.11	.02	-.63	-.34	.05	.34
Size of job classification	-.13	-.29	.24	-.20	.72	.55
Eigenvalue	.15		.06		.04	
Proportion of discriminable variance	.78		.48		.34	
Group means on the discriminant vectors						
No referent	.20		.14		-.17	
Self-inside	-.07		-.10		-.07	
Self-outside	-.55		-.42		.13	
Other-inside	.71		.48		.30	
Other-outside	-.08		-.28		.49	

^a Standardized discriminant weights = *w*; structure coefficients = *r_{xy}*.

DISCUSSION

This study examined relations between several situational factors—tenure, job level, departmental size, and size of job classification—and the comparative referents employees use when evaluating four job facets: compensation, job complexity, supervisory behavior, and security. Results showed that the situational factors had no effect on the referent categories employees selected when evaluating supervisory behavior and security. However, employees who used other-inside referents to evaluate compensation or job complexity tended to have long organizational tenure, and those who used self-outside referents for these facets had relatively short tenure. Two situational factors affected choices of referents for job complexity alone. Employees in high job levels or in large job classifications used other-outside referents when evaluating the complexity of their jobs.

In total, these results suggest that individuals with long tenure rely on information about the job complexity and compensation of their co-workers when evaluating these job facets. Individuals with short tenure may have little information about referents inside their organization and rely instead on their own personal experiences in different circumstances when evaluating job complexity and compensation. It is probable that employees with short tenure find contrasts involving their own experiences to be the most accessible and relevant when evaluating these facets. Individuals in large job classifications, or in upper-level jobs, may rely on other-outside referents

when evaluating job complexity, because their positions require them to have many contacts with persons outside the boundaries of their organizations and these contacts provide them with relevant information about the complexity of others' jobs.

There are several possible explanations for the generally weak results involving supervisory behavior and security. One possibility is that the situational factors investigated in this research were not relevant for selection of referents on these dimensions, and an entirely different set of factors influences such choices of referents; size of workgroup or proximity of co-workers might be relevant, for example. Another possibility is that too few employees used specific referent categories for these dimensions to permit meaningful statistical analyses. This appears likely in the case of supervisory behavior, for which only three employees used the other-outside category, and six used self-outside. More research is needed to examine the factors that affect choices of referents for supervisory behavior and security, as well as for other facets employees might contrast in organizations, such as advancement opportunities and relations with co-workers.

Several issues concerning the categories of comparative referents included in this study might have contributed to the results. The first is the nature of the categories themselves; they were very broad, and within each, substantial differences among referents might have existed. For example, an other-inside referent could refer to a co-worker, a subordinate, or to the president of the organization. If we had used narrower referent categories (e.g., co-worker-inside or friend-outside), we might have been able to detect stronger effects for several of the situational factors. Unfortunately, our data did not permit a more detailed classification of referents.

A second issue is the possibility that our method of measuring comparative referents prompted certain responses. We asked respondents to describe a facet and then to indicate if they used a comparative referent to evaluate that facet. Perhaps this line of questioning prompted people to indicate that they used referents when they actually did not. Although we cannot dismiss this possibility, there are reasons to doubt that prompting substantially influenced the results. First, many participants (between 26 and 52%) indicated that they did not use referents for certain facets, and these percentages are far greater than those previous studies obtained. For example, 41 percent of the participants did not use referents when evaluating job complexity, a figure substantially greater than the 24 percent Oldham and colleagues (1982) found. Second, interviewers in the current study were trained not to prompt participants and provided no verbal or visual cues before or after a referent choice was made. In addition, once participants indicated no use of comparative referents, interviewers asked no follow-up questions.

Furthermore, it is possible that asking participants to first describe a facet limited their subsequent choices of comparative referents. For example, employees who described their compensation as low may have consistently selected a particular referent category. To examine this, a series of one-way ANOVAs were conducted to determine if descriptions of facets varied by

referent category. No significant differences in facet descriptions emerged among the four categories of referents, providing no support for the possibility that the facet descriptions prompted responses. These arguments cast doubt on the possibility that employees were prompted in this research, but future studies should develop alternative methods and contrast them with our methods. For example, one method might involve asking employees to indicate how they decided how they felt about their job facets. These responses could then be coded to derive specific categories of referents. Future research might also examine the extent to which the results obtained in this study generalize to individuals employed by organizations in the private sector. The state employees examined in this research may have had access to information on referents, such as information about salaries, unavailable to private-sector employees. The possibility that access to such information may have influenced the results obtained warrants research attention in the future.

Finally, although this study was based on the referent-selection framework suggested by Goodman (1974, 1977), we conducted no direct test of the framework. Future research should attempt to do so, perhaps by measuring its central components, availability of information about referents and attractiveness of referents, and by examining a wide range of variables that are connected to these components. Research of this type would further advance our understanding of the comparative referents employees use when evaluating job facets.

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APPENDIX

The scale measuring compensation included the following items: (1) I am paid a great deal of money for performing my job; (2) I make enough money to take care of my family; (3) I get regular raises in this organization; (4) I get time off with pay on major holidays; (5) I make a considerable amount of money on my job; (6) If I were to die, my family would receive benefits from the organization; (7) I am entitled to take off several "personal" days with pay each year; (8) In total, my cash compensation is quite small; (9) I need additional income to make ends meet; (10) I receive a considerable amount of time off with pay in my position.

The scale measuring security included: (1) I'll be able to keep my present job as long as I wish; (2) My organization will not cut back on the number of hours I work each week; (3) If this organization were facing economic problems, my job would be the first to go; (4) I am confident that I will be able to work for this organization as long as I wish; (5) My job will be there as long as I want it; (6) If my job were eliminated, I would be offered another job in the organization; (7) Regardless of economic conditions, I will have a job in this organization; (8) I am secure in my job; (9) The organization would transfer me to another job if I were laid off from my present job; (10) My job is not a secure one.

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STABILITY OF THE FACTOR STRUCTURE OF THE JOB DESCRIPTIVE INDEX

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Sound measures are an important concern in the study of job satisfaction. A characteristic of a sound measure of job satisfaction is that it is psychometrically consistent over a wide variety of occupations and organizations. One way to demonstrate psychometric consistency is through establishing dimensional stability over situations. Under this criterion, one of the most promising measures is the Job Descriptive Index (JDI). The JDI is a carefully developed (Smith, Kendall, & Hulin, 1969/1975) and widely used (O'Connor, Peters, & Gordon, 1978; Yeager, 1981) 72-item instrument designed to tap five relatively orthogonal dimensions of job satisfaction: satisfaction with supervision, co-workers, pay, promotional opportunities, and the work itself.

An early factor analysis of the JDI items resulted in a reasonably clear five-factor solution (Smith et al., 1969/1975). However, a potential problem with that study is that the respondent-to-item ratio was well below the minimum five-to-one ratio recommended by Gorsuch (1983: 332). Even if the respondent-to-item ratio had met this criterion, the assessment of dimensional structure should be an ongoing process (Nunnally, 1978: 57-76). As Cattell, Balcar, Horn, and Nesselroade pointed out, "No psychologist can be content . . . with the outcome of factoring a single correlation matrix from a single experiment" (1969: 178).

Subsequent factor analyses have produced mixed results. For example, Smith, Smith, and Rollo (1974), using three groups of respondents, found that although the pay, promotion, and co-worker items loaded consistently from group to group, the supervision scale split into two factors (quality of supervision and personal characteristics) in all three groups. The work scale split into two factors, one descriptive and one evaluative, in one of the groups. The generalizability of these findings must again be questioned because the sizes of groups used were small.

Yeager (1981), using the entire workforce of a large software company ($N = 2,261$), performed a factor analysis on the JDI items that resulted in a

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nine-factor solution. Although the pay and promotion scales remained intact, the supervision and co-worker scales split into separate factors for ability and interpersonal relations. Moreover, the work scale split into three factors: challenging work, frustration with work, and fulfillment in work.

Yeager's (1981) solution warrants further investigation for a number of reasons. First, the solution is potentially stable and generalizable owing to the high ratio of respondents to items (30 to 1). Second, the split of the supervision scale into ability and interpersonal relations factors also appeared in a previous study (Smith et al., 1974). In addition, such a split is theoretically consistent with Locke's (1976) suggestion that satisfaction with supervisors is a function of entity attraction (interpersonal relations) and functional attraction (supervisory ability). Third, data from Gillet and Schwab (1975) also suggested the possible multidimensionality of the JDI work and supervision scales. These data indicated that the JDI supervision scale correlated with both the supervisor-human relations skills and supervisor-technical skills scales of the Minnesota Satisfaction Questionnaire (MSQ) (Weiss, Dawis, England, & Lofquist, 1967). The JDI work scale also correlated moderately with many of the MSQ scales.

The first purpose of the present study was to confirm the dimensional consistency of the JDI over a wide range of situations. To accomplish this goal, we first examined the stability of the five-dimension solution since it is the format used by practitioners and researchers at present, and few empirical studies have adequately demonstrated the psychometric consistency of these dimensions. Second, we assessed the stability of Yeager's (1981) nine-factor solution. If the dimensional splits found by Yeager occur consistently over a wide variety of situations, then the JDI might be improved by redesigning the instrument to provide information on these more specific dimensions. For example, the splits in the supervision scale that Yeager found may have important implications for research on supervisory leadership.

The second purpose of this study was to respond to one of the main complaints scholars have leveled against the use of factor analysis—specifically, the one-shot exploratory nature of most investigations (Cattell, 1978; Gorsuch, 1983). Unlike most factor analysis studies, the present study attempts to confirm hypothesized factor structures.

METHODS

Samples

Responses to the JDI items were collected between 1971 to 1980 from respondents in 11 different groups who represented a wide range of organizations and occupations. Each group was obtained from a different organization. The 11 groups ranged in size from 196 to 811 respondents, and 8 of the 11 groups met the criterion of having five respondents per item as suggested by Gorsuch (1983: 332). The average respondent-to-item ratio was over seven-to-one. The Appendix briefly describes these groups and gives their sizes.

Procedures

Factor extraction method. As a first step in examining the stability of the traditional five dimensions of the JDI, we performed a principal components analysis for each of the 11 groups with the number of principal components set to five and subsequent varimax rotation. This procedure resulted in 11 separate matrices of factor loadings (5 factors \times 72 items) that we then assessed for congruence using the congruence coefficient (Wrigley & Neuhaus, 1955) described in the next subsection.

A similar procedure was followed in assessing the stability of Yeager's (1981) solution. Again, as a first step, we used a principal components method of extraction with subsequent varimax rotation. The number of principal components was set to nine for this analysis. As did the analysis described in the preceding paragraph, this procedure resulted in 11 matrices of factor loadings (9 factors \times 72 items) that we then assessed for congruence.

Factor comparison method. A number of techniques for factor comparison are available. We chose to employ the congruence coefficient technique (Wrigley & Neuhaus, 1955) in this investigation because it has seen wide use and a number of Monte Carlo studies (e.g., Korth & Tucker, 1975) support its stability. This statistic ranges from -1.0 to $+1.0$ and is sensitive to both pattern and magnitude of factor loadings.

RESULTS

Stability of the Five-Factor Solution

In order to assess the stability of the five-factor solution, congruence coefficients were generated for all pairs of factors between all orthogonal pairs of respondent groups. For example, Factor 1 of group 1 was compared with each of the five factors in group 2, resulting in five congruence coefficients. We repeated this procedure for all possible pairs of factors between groups 1 and 2 and performed similar comparisons for all orthogonal pairs of groups. We named each factor after the items that had factor loadings greater than or equal to .40 on that factor. Resulting factors were defined as *like-named* if we judged both to represent the same construct based on factor loadings greater than or equal to .40. Table 1 presents the mean congruence coefficients and standard deviations of like-named factors across the 11 groups.

For instance, we calculated the mean congruence coefficient for the supervisor factor (.95) by taking the average of the congruence coefficients generated from the comparison of the supervision factors between all orthogonal pairs of groups. As can be seen in Table 1, the mean like-named congruence coefficients for each of the five dimensions are very high, with low standard deviations, pointing to the stability of the traditional five-factor solution across groups of respondents.

Factors were defined as *differently-named* if they were judged to represent different constructs in two groups. The mean congruence coefficients

TABLE 1
Mean Congruence Coefficients of "Like-named" Factor
Comparisons across All Sample Comparisons
for Five-Factor Solution

Factors	Means	Standard Deviations
Supervision	.95	.01
Co-workers	.95	.02
Work	.91	.03
Promotions	.95	.03
Pay	.86	.05

for differently-named factor comparisons were very low ($\bar{x} = .31$, $s.d. = .10$), again suggesting the stability of the traditional five-factor solution.

Stability of the Nine-Factor Solution

The procedure used in assessing the stability of the nine-factor solution (Yeager, 1981) was somewhat different from the procedure used in assessing the stability of the five-factor solution. In the second case, we were assessing a specific, empirical, dimensional structure for stability in different situations. Therefore, we used the matrix of factor loadings generated in Yeager's (1981) study as a target for comparison. Congruence coefficients were computed for all pairs of factors between this target and the 11 groups of respondents.

Considering the supervision factors first, the factors for supervisory ability/job knowledge and supervisory interpersonal relations found by Yeager (1981) were replicated in 9 of the 11 comparison groups. The mean congruence coefficient for the supervisory ability/job knowledge factor in these 9 comparisons was .93, with a standard deviation of .04. The mean congruence coefficient for the supervisory interpersonal relations factor in the 9 comparisons where this factor emerged was .92, with a standard deviation of .02. The traditional JDI supervision scale remained intact in samples 3 (agricultural employees) and 11 (midwestern manufacturing employees).

The traditional co-worker factor split in 8 of the 11 comparison groups. However, the split matched the Yeager (1981) co-worker factors in only 5 of these 8 groups. These five were groups 1, 4, 9, 10, and 11 (see the Appendix for descriptions). The mean congruence coefficient for the five comparisons of the co-workers' ability factor with Yeager's target was .93, with a standard deviation of .01. Likewise, the mean congruence coefficient for the corresponding five comparisons on the factor for co-workers' interpersonal relations was .91, with a standard deviation of .03.

Yeager's challenging-work factor emerged in all 11 of the comparison samples. The mean congruence coefficient was .90, with a standard deviation of .02. The frustration-with-work factor Yeager found was replicated in 10 of the 11 groups. This factor did not emerge in group 9 (working students). The mean congruence coefficient for the 10 groups in which this factor emerged was .77, with a standard deviation of .08. The fulfillment-in-work factor emerged only in group 5 (allied health professionals).

The traditional promotion scale remained intact in all 11 of the comparison groups, resulting in a mean congruence coefficient of .92, with a standard deviation of .04.

The traditional pay scale emerged in 9 of the 11 comparison groups, resulting in a mean congruence coefficient of .92, with a standard deviation of .04. The traditional pay factor split in groups 1 (pharmacists in North Carolina) and 5 (allied health professionals). These two pay factors seem to represent actual levels of pay and equity of pay dimensions.¹

DISCUSSION

Five-Factor Solution

The data suggest that the five traditional JDI dimensions (supervision, co-workers, pay, promotion, and work) are very stable across a wide variety of situations and groups of respondents. This result is important given the widespread use of the JDI in the measurement of the satisfaction construct (O'Connor et al., 1978; Yeager, 1981). Given the results of this study, practitioners and researchers who use the JDI can be confident that its dimensionality is not sample-specific. As with any psychometric measure, users of the JDI are encouraged to check the dimensionality of the instrument if possible. However, given the strong evidence for the stability of the five-factor solution, users of the JDI need not be concerned that the traditional five-factor structure is inappropriate.

Nine-Factor Solution

Although the data are not unequivocal enough to suggest that the JDI should be rescored on a new scheme reflecting more than the traditional five dimensions, a number of factors emerged consistently enough to suggest that these factors could be refined into new scales in future revisions of the JDI.

The two supervision factors (supervisory ability/job knowledge and interpersonal relations) emerged in 9 of the 11 groups of respondents. Smith and colleagues (1974) obtained two similar supervision factors.

The empirical split of the JDI supervision dimension corresponds to a theoretical discussion of satisfaction with supervision presented by Locke (1976). Locke suggested that the relationship between supervisors and subordinates is based on two types of attraction: functional attraction and entity attraction. Functional attraction for a supervisor depends on the extent to which a subordinate sees that supervisor as providing or helping the subordinate obtain important job values. It corresponds to a large extent with the supervisory ability/job knowledge factor identified in the present study. The items consistently loading on this factor, for example, included influential, up-to-date, tells me where I stand, knows job well, and around when

¹ Tables of the factor loadings, and more detailed tables of the congruence coefficients for both the five- and nine-factor solutions can be obtained from the first author.

needed. Supervisors with such characteristics certainly could help subordinates obtain their desired objectives or job values.

According to Locke (1976), entity attraction is based upon the extent to which subordinates like supervisors or perceive them as fundamentally similar to themselves in basic attitudes, values, and philosophies. This type of attraction clearly corresponds to the factor for supervisory interpersonal relations obtained in the present study. Locke suggested that measures attempting to assess satisfaction with a supervisor should reflect these two dimensions. Given Locke's theoretical discussion and the consistent empirical split of the supervision scale, future research on the JDI should focus on refining the supervision scale into two scales reflecting (1) ability and job knowledge, and (2) interpersonal relations.

This scale refinement may prove useful to researchers in several areas, including supervisory leadership. Leadership researchers have been attempting for a number of years to define clearly a relationship between variables measuring leaders' behaviors and outcome variables such as satisfaction with supervisors (Bass, 1981; Korman, 1966). Data have suggested that ratings of leaders' initiating-structure behavior have not typically been related to satisfaction with these supervisors (Korman). Perhaps the reason for this disappointing result is that a leader's structuring behavior is related to only one type of satisfaction with supervision, satisfaction with ability and job knowledge, or functional attraction. Similarly, a supervisor's consideration behavior may be most highly related to satisfaction with the supervisor's interpersonal characteristics, or entity attraction. Unless satisfaction with supervision is precisely measured in terms of a refined scale, relationships between variables measuring leaders' behaviors and satisfaction with supervision may not clearly emerge.

Two of Yeager's (1981) three work factors (challenging work and frustration with work) were replicated consistently. A major problem in both the present study and Yeager's study arises in naming these factors. The items loading consistently on the factor for challenging work (fascinating, routine, boring, good, creative, challenging, simple, and gives sense of accomplishment) perhaps are best thought of as core items for the dimension of satisfaction with the work itself. Only two items loaded consistently on the frustration-with-work scale (frustrating and endless). The item "hot" also loaded on this scale, although less frequently. These items are perhaps simply weak measurements of the construct of interest, satisfaction with the work itself, and perhaps should be eliminated or simply rewritten.

The split of the co-workers' scale into ability and interpersonal factors was replicated in 5 of the 11 respondent groups. This suggests that the traditional scale may be adequate in many situations. However, in jobs requiring interaction among co-workers and at least moderate skill, these dimensions may be of interest. Thus, refinement of the co-workers' items into two scales might be useful. Finally, as in the Yeager (1981) study, the traditional pay and promotion scales appeared adequate.

CONCLUSIONS

In summary, three general conclusions can be made: First, practitioners and researchers currently using the JDI in its present form can be confident that the instrument behaves consistently over a wide variety of situations. Second, dimensional splits found by Yeager (1981) in the supervision and co-workers' scales occurred consistently enough to warrant further investigation. Third, several items on the work scale should be revised, or else subscales we identified should be conceptually defined more clearly.

As a final point, the factor structures investigated in the present study should be examined with alternative methods, such as confirmatory factor analysis.² If use of other methods verifies the conclusions we reached, even more confidence can be placed in the results, and these conclusions could be viewed as independent of either method.

² LISREL (Jöreskog & Sörbom, 1984) could be used, for example.

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APPENDIX

The following briefly describes groups of respondents and gives their sizes.

- Group 1. Pharmacists located in a southeastern state (n=376).
- Group 2. Pharmacists located in a midwestern state (n=196).
- Group 3. Employees of a midwestern agricultural company (n=315).
- Group 4. Junior college graduates located in a western state who graduated between 1962 and 1971 (n=494).
- Group 5. Allied health professionals including medical dietitians, physical therapists, occupational therapists, and medical technologists, located in the Midwest (n=803).
- Group 6. Engineers, geologists, and geophysicists (n=477).
- Group 7. Managers from diverse organizations (n=715).
- Group 8. Employees drawn from all hospital jobs in an urban midwestern hospital (n=811).
- Group 9. Working students located in a southwestern city (n=222).
- Group 10. Employees from a nuclear power plant construction site, including managers, engineers, clerical workers, and engineering aides (n=672).
- Group 11. Employees of a manufacturing organization in the Midwest (n=506).

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SELF-ESTEEM AND TASK PERFORMANCE IN QUALITY CIRCLES

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Quality circles are small groups of employees from the same department who voluntarily and regularly meet in order to identify, analyze, and solve problems related to workgroups. Many leaders of U.S. industry believe that quality circles are a major cause of the success of their Japanese competitors. As a result, in the past ten years many U.S. companies have implemented such programs (Lawler & Mohrman, 1985). But how effective are quality circles? Do they produce the tangible benefits, such as increased productivity, and intangible ones, such as reduced management-worker conflict, that their proponents claim? To date, there has been very little evaluative research on quality circles. In fact, some studies fail to provide evidence that they are effective. Cox and Norris (1983) reported that members of quality circles were actually less productive and more frequently absent than were employees from the same organization who were not members. In addition, Cox and Norris found no differences between the work performance, absenteeism, and tardiness of members of quality circles before and six months after their joining a group.

Rather than assuming uniformly that quality circles are either effective or ineffective, it probably makes more sense to adopt a contingency approach. Some groups will be effective whereas others will not. Thus, the conceptual and empirical task is to identify the factors that predict the success of quality circles. Theory and research on process and effectiveness in small groups may provide some useful leads. Building on the work of McGrath (1964), Steiner (1972), and others, Hackman and Morris (1975) suggested that a group's effectiveness is a function of three summary variables: effort, knowledge and skills, and strategies for task performance. The extent to which the summary variables are present is a result of processes of group interaction, which in turn are a function of a number of input variables. One likely input variable is the initial composition of group members. Simply put, groups are more apt to function effectively if their individual members possess the skills necessary to do so.

In addition to the literature on small group effectiveness, several conceptual analyses of the factors affecting the success of quality circles exist.

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Wood, Hull, and Azumi (1983) speculated that "two conditions are necessary for the successful implementation of a QC program. First, employees have to believe that their support and participation will benefit themselves as well as the organization. The second condition is that participants in QCs must be well trained in the group dynamics and problem-solving methods that are part of the QC technology" (1983:41).

Integrating these remarks about small group performance in general and the effectiveness of quality circles in particular, we propose that such groups will be effective to the extent that individual, group, and organizational input variables elicit the two conditions that Wood and colleagues (1983) posited as necessary for their success. We focused on a variable at the individual level: the self-esteem of group members. Recent research on personality has shown that self-esteem is positively related to both conditions that Wood and coauthors deemed necessary for a quality circle's success. In particular, individuals with high self-esteem possess a greater sense of self-efficacy than individuals with low self-esteem (Bandura, 1977) and thus are more apt to believe that such actions as giving support and participating will produce successful outcomes. In addition, persons with high self-esteem are more poised socially (Zimbardo, 1977), which should enable them to engage in the interpersonal behavior necessary for the success of a quality circle.

In summary, this study was designed to test the hypothesis that the self-esteem of members of a quality circle is positively related to the group's success. Positive results would (1) provide some initial support for a contingency model of the effectiveness of quality circles, and (2) extend into the realm of group performance the positive relationship between self-esteem and task performance that has been often—though not always—demonstrated for individual performance (Hamachek, 1971).

METHODS

Participants were 66 employees of a major computer manufacturing plant in the southwestern United States. All were members of quality circles that met weekly for one hour during a workday.

At the beginning of a regularly scheduled meeting, the junior author, a midlevel manager in the organization, asked participants to complete anonymously a brief questionnaire "for research purposes." The questionnaire included the revised Janis-Field self-esteem scale (Eagly, 1967), which consists of 18 items. Subjects had to rate on 5-point scales the frequency with which the items were self-descriptive, ranging from 1 = very often to 5 = practically never. Items included: "In general, how confident do you feel about your abilities?" and "How often do you feel that you handled yourself well at a social gathering?" In a review of the psychometric properties of self-esteem scales, Robinson and Shaver (1973) characterized this measure as one of the best for use with normal adults. Perhaps the best evidence of the measure's validity stems from the results of no fewer than 15 experiments, conducted by Brockner and his colleagues (e.g., Brockner, Davy, & Carter,

1985; Brockner & Guare, 1983), in which the Janis-Field scale was used to assess self-esteem. In these studies, individuals with high self-esteem always differed from those with low self-esteem on the dependent variables of interest in the expected direction.

A quality circle was designated as relatively successful if it had generated at least two solutions to problems that upper level management actually accepted and implemented.¹

Nine quality circles, ranging in size from 3 to 12 members, participated in the study. The groups had been meeting regularly from 3 to 12 months. Using the criterion just described, we determined that four quality circles were successful, and five were unsuccessful. The groups' organizational responsibilities consisted of a variety of blue-collar and subprofessional functions, including quality control, manufacturing, purchasing, and shipping. It is important to mention that the functions of successful and unsuccessful groups did not appreciably differ. For example, of the three groups whose function was quality control, one was successful whereas two were not.

The measurements of self-esteem and of the quality circle's degree of success were conducted independently of one another. When members completed the self-esteem scale, they were unaware that their ratings were going to be statistically compared to the group's success. Moreover, at the time that we classified the groups as successful or unsuccessful, we were unaware of the self-esteem levels of the participants.

RESULTS

For each of the nine quality circles, we computed the mean self-esteem score of its individual members. For the successful groups, the means were 69.80, 70.42, 71.00, and 73.57. For the unsuccessful groups, the means were 63.75, 63.75, 65.86, 66.00, and 69.00. The lack of any overlap between the distributions of mean self-esteem scores for the successful and unsuccessful groups was striking. The mean level of self-esteem of the successful groups was significantly higher than that of the unsuccessful groups (71.20 and 65.67; $t_7 = 4.21$, $p < .001$).

It is possible that the size of quality circles covaried with self-esteem or group success and thereby rendered spurious the positive association between the second two variables. However, there was no relationship between the size of a quality circle and the average level of self-esteem of its members ($r_7 = .12$). In addition, size was not significantly larger for successful quality circles compared to unsuccessful ones ($\bar{x} = 8.5$ and 6.4 members, $t_7 = 1.10$).

¹ In addition, a staff advisor whose organizational role was to oversee the quality circle program provided a subjective appraisal of the quality and quantity of each group's presentations to top management. Not surprisingly, this advisor's evaluations matched the classifications we made using the more objective criterion.

The length of time that the group members had met also could have rendered the relationship between self-esteem and a quality circle's performance artifactual, if longevity were related to either of those two variables. However, there was no association between group longevity and self-esteem ($r_7 = .09$). Furthermore, the longevity of the successful groups was virtually identical to that of the unsuccessful groups ($\bar{x} = 9.50$ and 9.00 months, $t_7 = 0.20$).

DISCUSSION

Quality circles have recently received considerable attention from organizational scholars and practitioners, but most conceptual analyses of these groups lack empirical data (Lawler & Mohrman, 1985; Wood et al., 1983). The present findings are thus noteworthy in that they represent one of the few empirical attempts to delineate the factors associated with the task performance of quality circles (cf. Dean, 1984; Griffin & Wayne, 1984).

In this study, the mean self-esteem level of the individuals in each quality circle was highly predictive of the group's task performance. Successful and unsuccessful circles did not differ in their size, longevity, or organizational function. Moreover, self-esteem was uncorrelated with group size, longevity, or function, thereby discounting the possibility that the relationship between self-esteem and performance was a spurious function of any of these variables.

The present study does have a number of limitations that it may be useful to discuss as we consider avenues for future research. Given the nature of the task facing members of quality circles, perhaps the mean level of *all* group members' self-esteem is not the most appropriate central tendency measure. For example, if the task performed by quality circles is disjunctive, only the self-esteem of the most competent member may be predictive of group success. If the task of quality circles is conjunctive, the self-esteem of the least competent member may be most predictive of group success.² Accordingly, we conducted several additional analyses, first establishing that the mean self-esteem level of the individual possessing the highest self-esteem was 80.75 in the successful groups and 75.00 in the unsuccessful groups ($t_7 = 2.00$, $p < .05$). This difference grew even larger when the mean self-esteem levels of the two individuals possessing the highest self-esteem in the successful (79.63) and unsuccessful (73.00) groups were compared ($t_7 = 2.46$, $p < .025$).

Second, the mean self-esteem level of the individual possessing the lowest self-esteem was greater in the successful (60.00) than in the unsuccessful (55.20) groups. This difference did not attain significance ($t_7 = 1.37$,

² According to Steiner (1972), disjunctive tasks are those that permit any single member to supply the group's product. Said differently, on disjunctive tasks groups perform at the level of the most competent member. Conjunctive tasks require all group members to supply the group's product; thus, groups with such tasks perform at the level of the least competent member.

$p < .11$). However, when we compared the mean self-esteem levels of the two individuals possessing the lowest self-esteem in the successful (62.00) and unsuccessful (56.40) groups, a significant difference did emerge ($t_7 = 2.04$, $p < .05$). In short, regardless of the conceptualization of the task quality circles' members face, and regardless of the associated unit of analysis, the conclusion is the same: there is a positive association between group members' self-esteem and the group's success.

One possible limitation of our findings is that they were based on a relatively small population; we studied only 66 workers organized into nine quality circles, thereby calling into question the external validity our results. The results of a study conducted concurrently by Griffin and Wayne (1984) are relevant to this question. The participants in that study were 457 employees organized into 44 quality circles. Griffin and Wayne also observed a significant ($p < .001$) positive relationship between the success of groups and the mean self-esteem level of their members, suggesting that the present findings are generalizable.

This study employed an objective performance criterion—whether a quality circle had at least two solutions accepted and implemented by management. Of course, it is important to know whether the solutions proposed by the successful groups actually produced favorable outcomes like increased productivity or reduced costs. In short, future researchers would be well advised to include additional objective measures of quality circles' task performance in their studies.

The results reported here do not specify any cause of the relationship between self-esteem and the success of quality circles. As in any correlational study, three causal explanations are possible. The first possibility is that self-esteem caused performance. Small group research (Hackman & Morris, 1975; McGrath, 1964) has posited that a variety of inputs can affect a group's performance. Among them are the attitudes and personalities that individuals bring to a group. Furthermore, Wood and coauthors (1983) implied that individuals with high self-esteem may be more likely to possess the skills requisite for a quality circle's success. If this analysis of the present results is correct, an important task for future research is to delineate the precise processes of group interaction that mediate the relationship between self-esteem and performance in quality circles (Hackman & Morris, 1975).

The second possibility is that performance of the quality circle caused self-esteem. Although self-esteem is typically conceived of as a fairly stable trait, it is also quite possible that individuals' self-esteem fluctuates to some extent across situations having different self-evaluative implications. Measuring self-esteem in the context of a quality circle meeting may have made favorable or unfavorable thoughts associated with the group's performance salient to members. Such thoughts as "I belong to a competent, successful group" could have temporarily affected their self-esteem.

The third possibility is that self-esteem and performance are related because of their common covariation with other factors. For example, it is possible that the two attributes believed to lead to the success of a quality

circle, problem-solving ability and skill in group processes, are correlated with both self-esteem and performance. Perhaps individuals who are skilled in group process have higher self-esteem and also facilitate effective performance of quality circles.

The specification of the causal relationships between self-esteem and the performance of quality circles remains an important task for future research. However, it should be emphasized that the mere existence of a correlation between these two variables has several practical and theoretical implications. At the practical level, if it appears that a quality circle contains mainly persons with low self-esteem, management should take steps to ensure that the group does not fall into a vicious cycle of poor performance and continued low self-esteem. For instance, management should be especially careful to praise or encourage any meritorious work, such as useful suggestions about existing problems, that emerges from such groups.

At the theoretical level, the results support the conceptual foundation upon which this study was based. As a general rule, quality circles are neither effective or ineffective—rather, some will produce favorable outcomes and others will not. One of the tasks confronting future researchers studying such groups is to specify the factors associated with their success. There are undoubtedly many other individual, group, and organizational variables that also moderate the effectiveness of quality circles.

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PERCEPTIONS OF RESOURCE CRITICALITY IN TIMES OF RESOURCE SCARCITY: THE CASE OF UNIVERSITY DEPARTMENTS

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Recently, management scholars have devoted increasing attention to the issues of scarcity and criticality of resources in universities. Two studies (Pfeffer & Moore, 1980a; Salancik & Pfeffer, 1974) examined the relationship between resource scarcity and the use of power in university budgeting. Cameron (1983) and Whetten (1981) described adaptations of universities to decline and to scarcity of resources. Dallam and Hoyt (1983) studied faculties' preferences for retrenchment options and found a preference for options that would preserve faculty positions, even at the cost of other departmental resources. Finally, Salancik and Pfeffer (1974) extended their analysis of resource scarcity to the closely related dimension of criticality of departmental resources.

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This study builds on previous work by examining perceptions of the criticality of personnel resources—both support staff and faculty—in times of general scarcity of resources in a university college. The focus of the study is on the relationship between respondents' perceptions of the relative criticality of support staff and faculty and the value respondents place on research. We also examined how the level of paradigm development of respondents' academic disciplines moderates this relationship. The results of the study have implications for theory and for the practical problem of designing departmental retrenchment strategies in universities.

THEORETICAL BACKGROUND

Academic departments in universities have two major personnel components, faculty and support staff. Typically, the role of faculty is to contribute to the standard, tripartite departmental mission of teaching, research, and service. Support staffs generally have two subcomponents: graduate assistants, and classified staff, including secretaries, administrative assistants, and technical personnel.

The typical role of graduate assistants is to help faculty members teach and conduct research projects. In the first role, graduate assistants help reduce the teaching loads of regular faculty, allowing them to devote more time to nonteaching aspects of the departmental mission, especially research. In the second role, graduate assistants also contribute to the research function. Thus, at least in research-oriented universities, graduate assistants are a vital resource for faculty research.

Classified staff are an equally important resource for research. For example, Bingen and Siau (1981) noted that secretaries play an important role in administering research grants and contracts, as well as in processing research reports and articles. Administrative assistants liberate faculty from routine administrative tasks so they can concentrate on research work. Finally, in the hard sciences, the operation and maintenance of complex equipment make technicians an important resource in research projects.

To summarize, in research-oriented universities, support staff—graduate assistants and classified personnel—are human resources essential to the accomplishment of the research function. In times of scarcity, when resource constraints or even cutbacks threaten departments, the natural expectation is that faculty would give priority to preserving their own positions (Dallam & Hoyt, 1983). Thus, during scarcity, they should view faculty as the most critical departmental personnel. However, the argument introduced at the beginning of this section implies that faculty who are committed to research are aware of the criticality of support staff. Accordingly, we expect

Hypothesis 1: The more highly a faculty member values research, the greater the perceived criticality of support staff relative to faculty positions in times of scarcity.

This relationship is expected to vary with the development of the paradigms of respondents' academic disciplines. Lodahl and Gordon (1972) presented data showing that, in disciplines with highly developed paradigms,

such as the physical sciences, there is relatively little uncertainty about appropriate curriculum content. Thus, compared to those in other disciplines, graduate assistants require less supervision in teaching and may be a more valuable resource for relieving faculty of teaching duties. Additionally, standard vocabularies and accepted bodies of knowledge in disciplines with highly developed paradigms facilitate communication and decision making with graduate assistants in collaborative research projects. Thus, in both indirect and direct support roles, graduate assistants may make a more important contribution to faculty research in high-paradigm disciplines.

Paradigm development is also associated with differences in levels of grant support (Lodahl & Gordon, 1973; Pfeffer & Moore, 1980a) and in the use of sophisticated research equipment. The dependence on grants in high-paradigm disciplines suggests that secretaries and administrative assistants play an especially critical support role for research by administering sponsored funding and processing proposals. Additionally, the use of complex equipment for research means that departments in high-paradigm disciplines require technical staffs to operate and service equipment (Bresser, 1983). This implies that, like graduate assistants, classified staff play a particularly important role in supporting faculty research in disciplines with highly developed paradigms.

In sum, we have argued that support staff—graduate assistants and classified personnel—are a more important resource for support of faculty research in disciplines with highly developed paradigms than in other disciplines. To the extent that faculty are aware of this difference, in times of scarcity, research-oriented faculty in high-paradigm disciplines should view support staff as an especially critical resource to be preserved, even relative to faculty. This suggests a moderating effect of paradigm development on the first relationship hypothesized.

Hypothesis 2: The higher the paradigm development of a respondent's academic discipline, the stronger the relationship between value placed on research and perceived criticality of support staff relative to faculty in times of scarcity.

METHODS

Sample

Data were collected from members of the College of Liberal Arts and Sciences in a major midwestern state university. In the year of data collection, the university had ten colleges, 1,168 faculty members, and 22,683 students; awarded 203 Ph.D. degrees; and spent approximately \$14 million, or 20 percent of its operating budget, on research. The last two figures attest to this university's research orientation.

The College had faced seven years of resource scarcity prior to this investigation. For the first five of these years, it had lost positions every year, for a 12 percent overall decline in positions. It also suffered 6 and 10 percent

declines in total and freshman and sophomore student credit hours. Although the College regained positions in the last two of the seven years, an unanticipated increase in student credit hours during the latter part of the period created scarcity relative to the demand for services.

Standardized questionnaires were sent to a random sample of 128 faculty and administrators, 75 of whom returned completed questionnaires, giving a response rate of 59 percent. Teaching faculty composed 51 percent of the respondents, and 49 percent were administrators, heads of departments or higher level administrators. Seven percent were instructors, assistant instructors, or lecturers; 3 percent were assistant professors; 27 percent were associate professors; and 63 percent were full professors. Most of the respondents (93%) had doctoral degrees; their average career age (years since highest degree) was 17, and 95 percent were men.

Comparisons between respondents and nonrespondents indicated that the two groups did not differ significantly on career age, gender, or percentage with doctoral degrees. The respondents, however, had more administrators and high-ranked faculty. Because these individuals are highly influential in university policy making, their prevalence in the group of respondents might enhance this study's practical value.

Measures

Dependent variable. Perceived criticality of personnel resources was assessed by asking respondents to evaluate, on a 9-point scale, the criticality of (1) faculty positions, (2) graduate assistants, and (3) classified staff in times of general scarcity of resources. Following Salancik and Pfeffer (1974), we defined criticality for respondents as the degree to which a resource was needed to maintain their departments' effective operation. We constructed a ratio variable of perceived criticality of support staff relative to faculty by averaging each respondent's ratings of the criticality of graduate assistants and classified staff and then dividing this average by the criticality rating for faculty positions. Because the distribution of this ratio variable was highly skewed (positively), we transformed the original scores to lognormal scores: transformed score = $\ln(\text{ratio} + 1)$. The constant of 1 was added to the ratio to avoid the inconvenience of negative scores.

Independent variable. The value respondents placed on research was assessed by asking them to rank a set of criteria according to how they would use them in determining the overall merit of a department (10 = most important, 1 = least important). One criterion was the number of doctoral degrees awarded annually. In a research-oriented university, where doctoral research is an integral part of the overall research function, high rankings for this criterion of merit would indicate that a respondent valued research highly. In addition, the number of doctoral degrees granted has been recommended as a measure of research output (Chan, 1978). A second criterion, number and quality of faculty publications and papers presented, also has to do with research. We averaged rankings of these two criteria for the measure of research orientation.

Moderating variable. The development of paradigms was assessed in terms of the length of the longest chain of prerequisite courses in a discipline. Earlier research (Pfeffer & Moore, 1980b; Salancik, Staw, & Pondy, 1980) showed that lengths of prerequisite course chains were highly correlated with other measures of paradigm development, such as the length of dissertations and dissertation abstracts, in several academic disciplines. Prerequisite course chains constitute a localized indicator of paradigm development (Pfeffer & Moore, 1980b) that takes into account possible differences between universities in combinations of specialties making up a discipline.

Using university catalogs, we coded the longest chain of courses prerequisite to any single course for each academic discipline that contributed respondents. We then ranked the disciplines from longest chain, indicating high paradigm development, to shortest chain, indicating low paradigm development. Each respondent received a paradigm development score equivalent to the rank score for that individual's discipline. We validated our rankings of paradigm development by comparing them to previous rankings (Pfeffer & Moore, 1980b; Salancik et al., 1980). For the disciplines that overlapped, the correlation between our rankings and Pfeffer and Moore's was .79 ($p < .01$); between our rankings and Salancik and colleagues', it was .86 ($p < .01$). Table 1 lists the academic disciplines represented in this study, their paradigm-development scores, and the number of respondents from each discipline.

Control variables. Because of their potential influence on research orientation and perceptions of resource criticality, we included job status (0 = teaching faculty; 1 = administrator) and academic rank of respondents as controls in the analysis. A third control variable was respondents' perceptions of the criticality of departmental operating funds in times of scarcity. We collected data for this variable in conjunction with those on the perceived relative criticality of departmental personnel, the dependent variable. Because a tradeoff might exist between ratings of the criticality of operating funds and personnel, it was necessary to control for the former in order to avoid confounding the results.

Analytic Procedures

Hypothesis 1 was tested by regressing the dependent variable on research orientation, after controlling for job status, academic rank, perceived criticality of departmental operating funds, and paradigm development.¹

Hypothesis 2 was tested by moderated regression. We regressed the dependent variable on the five variables mentioned in the preceding paragraph and on a cross-product term, respondent's research orientation \times paradigm development. The cross-product term was used to assess the moderating effect of paradigm development on the relationship between research orientation and the dependent variable, independent of the main effects of paradigm development and research orientation. The sign of the regression

¹ A high score indicated a high level of paradigm development.

TABLE 1
Development of Academic Disciplines' Paradigms^a

Academic Disciplines	Paradigm-Development Ranking	Number of Respondents
Chemistry	1.5	5
Physics	1.5	2
Computer science	3	2
Mathematics	4	1
Geology	5	1
Radiation biophysics	6	2
East Asian languages	7	2
Psychology	8	5
Classics	9.5	2
Economics	9.5	1
Biological sciences	11	7
French/Italian	13	2
Germanic languages	13	1
Speech/drama	13	5
Human development	15	5
Slavic languages	16	2
Geography	17	2
Spanish/Portuguese	18	1
English	20	5
Interdisciplinary studies	20	1
Sociology	20	2
Microbiology	22	3
Anthropology	25	2
History	25	3
Political science	25	3
Religious studies	25	2
Soviet & East European studies	25	1
Latin American studies	28.5	1
Western civilization	28.5	2
Total number of respondents		73 ^b

^a Lower numbers indicate higher levels of paradigm development.

^b For two respondents, academic discipline could not be determined.

coefficient for the cross-product term provides information on how the relationship between the independent and dependent variables changes across levels of the moderating variable. A positive sign indicates that the greater the score on the moderating variable, the more positive the relationship between the independent and dependent variables. If a cross-product term is statistically significant, the main effects of the component variables that appear in the same equation must be interpreted with caution (Fry & Slocum, 1984).² Table 2 presents the descriptive statistics and zero-order correlations for the study's variables.

² For further discussion of moderated regression, see Saunders (1956) and Zedeck (1971).

TABLE 2
Descriptive Statistics and Zero-Order Correlations
for Study Variables

Variables	Means	s.d.	1	2	3	4	5	6	7
1. Job status ^a	0.49	0.50	—	.29**	.16	-.01	.02	-.01	-.03
2. Academic rank	3.48	0.84		—	.30**	.06	.22*	.17	.07
3. Perceived criticality of departmental operating funds	6.13	2.02			—	.06	.06	.07	-.11
4. Paradigm development ^b	15.66	7.94				—	.18	.93**	.12
5. Research orientation	6.67	1.39					—	.50**	.25**
6. Research orientation × paradigm development	108.11	63.85						—	.22*
7. Perceived criticality of support staff relative to faculty ^c	0.65	0.28							—

^a Dichotomous variable coded 0 or 1.

^b High score means high level of paradigm development.

^c Lognormal scores.

* $p < .10$, two-tailed tests

** $p < .05$, two-tailed tests

RESULTS

The results in the column entitled linear model in Table 3 show a positive relationship ($b = .0458$, $s.e. = .0269$, $p < .05$) between research orientation and the dependent variable. Results in the column entitled moderated model show that paradigm development positively moderated this relationship, as indicated by the positive coefficient for the cross-product term, research orientation × paradigm development. Thus, the results support Hypotheses 1 and 2.

Additional analyses were performed on the two components of support staff: graduate assistants and classified staff. We constructed two ratio variables, transforming original scores to lognormal scores, and used them as dependent variables. These variables were (1) perceived criticality of graduate assistants relative to faculty, and (2) perceived criticality of classified staff relative to faculty. For each new dependent variable, we repeated the analyses performed for the original dependent variable, but also controlled for the perceived criticality of the personnel resource omitted from each new dependent variable. Results indicated that the same pattern of relationships existed. Respondents' research orientation was positively related to both the perceived criticality of graduate assistants relative to faculty ($b = .0486$, $s.e. = .0315$, $p < .10$) and to the perceived criticality of classified staff relative to faculty ($b = .0397$, $s.e. = .0283$, $p < .10$). Further, paradigm development positively moderated both these relationships, as shown by the positive coefficients ($b = .0120$ and $.0093$, $s.e. = .0052$ and $.0047$, $p < .05$ and $.05$) for

TABLE 3
Results of Regression Analysis for Perceived Criticality
of Support Staff Relative to Faculty^a

Predictors	Unstandardized Coefficients	
	Linear Model	Moderated Model
Job status	-.0164 (.0749)	.0116 (.0738)
Academic rank	.0216 (.0471)	-.0229 (.0503)
Perceived criticality of departmental operating funds	-.0192 (.0187)	-.0145 (.0182)
Paradigm development	.0029 (.0046)	-.0635 [†] (.0315)
Research orientation	.0458* (.0269)	-.0981 (.0725)
Research orientation × paradigm development		.0095* (.0045)
R ² =	.09	.16
	$F_{5,55} = 1.04$	$F_{6,54} = 1.67$

^a Coefficients are unstandardized regression coefficients (b's). Values in parentheses are the standard errors of the coefficients.

*p < .05, one-tailed tests for hypothesized relationships, predicted in advance.

[†]p < .05, two-tailed tests for control variables.

the cross-product terms. Taken together, these results provide additional support for the relationships hypothesized in this study.³

DISCUSSION AND CONCLUSIONS

This study's findings suggest that, in times of scarcity, research-oriented faculty and administrators view support staff as more critical relative to faculty than do their colleagues who value research less. Further, the relationship between research orientation and perceived criticality of support staff relative to faculty is significantly stronger in academic disciplines with

³ To provide some assurance that other values of respondents did not have similar relationships with our dependent variables, we repeated the analyses reported in this paper, substituting a measure of teaching orientation for the measure of research orientation. The teaching-orientation measure was constructed by averaging respondents' rankings of two criteria of departmental merit related to teaching: the quality of departmental teaching and the number of undergraduate credit hours taught. Data on these variables were collected in conjunction with the criteria that formed our measure of research orientation. Results showed that teaching orientation did not have a significant linear relationship with any of our dependent variables, and there were no significant moderating effects of paradigm development on any of these relationships.

highly developed paradigms. These findings are consistent with past research that has examined the use of graduate assistants and classified staff in disciplines of varying levels of paradigm development (Bresser, 1983; Lodahl & Gordon, 1972).

Because this study was conducted in a university college experiencing resource scarcity, inferences from its results are appropriate to conditions of scarcity. Similar findings might be observed under conditions of abundance, a possibility that cannot be tested empirically with these data. However, Pfeffer and Moore (1980b), among others, argued that scarcity of resources increases conflict. Since conflict threatens consensus and the power of group norms, scarcity may enhance the effects of certain individual values on perceptions. Further, Pfeffer and Moore's (1980b) analysis suggests that scarcity may augment the importance of differences in paradigm development and associated differences in consensus. In sum, scarcity may increase the effects of research orientation and paradigm development on perceptions of criticality of resources. Future research could test this hypothesis by examining the generalizability of our findings to conditions of abundance.

These results reinforce the utility of considering variations in contextual and individual characteristics simultaneously when explaining organizational behavior (Rousseau, 1978). The contextual attribute we measured was the paradigm development of respondents' academic disciplines, which interacts with their orientations toward research to influence their assessments of the criticality of support staff and faculty in times of scarcity. Future researchers might examine the moderating effects of other contextual attributes, such as type of decline confronting an organization (Zammuto & Cameron, 1985), on perceptions of the criticality of resources.

Finally, the results of this study suggest a contingency approach to departmental retrenchment. In academic departments with many research-oriented faculty members, particularly departments in high-paradigm disciplines, retrenchment is likely to be most acceptable if it makes preserving the positions of support staff as well as faculty a priority. In departments with fewer research-oriented faculty, and particularly those in low-paradigm disciplines, acceptance of retrenchment may not be so dependent on preserving support staff. Thus, university administrators might vary their proposals for departmental retrenchment depending on the contexts and values of the departments involved, instead of proposing standard, across-the-board cuts in resources. However, extensive replication research should take place before administrators base specific retrenchment decisions on these suggestions.

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ASSESSING THE VALIDITY OF THE COX, ZMUD, AND CLARK MATERIAL-REQUIREMENTS-PLANNING AUDIT INSTRUMENT

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Implementing material requirements planning (MRP) systems is poorly understood, perhaps because previous research has examined this process with methodologies that limit ability to validate results. There have been significant efforts to develop sophisticated MRP auditing instruments (Anderson, Schroeder, Tupy, & White, 1982; Blasingame & Weeks, 1981; Cox, Zmud, & Clark, 1981), but these instruments have not been validated. The purpose of this study was to conduct a partial validation of the MRP Audit Instrument designed by Cox and his colleagues.

RESEARCH ON MRP IMPLEMENTATION

Most of the literature on implementing MRPs comes from reports of practitioners and consultants. Recent research, however, broadened its perspective by examining the status of MRP implementations in industry as a whole. In one of the most comprehensive studies to date, Schroeder, Anderson, Tupy, and White (1981) found that MRP users reported improvements in inventory turnover, lead times of deliveries, and a host of other benefits. Findings of a second comprehensive study (White, Anderson, Schroeder, & Tupy, 1982) indicated that organizations encountered similar problems during implementation, including education of personnel and lack of top management support. Unfortunately, neither study presented the questionnaire used nor any supporting evidence for its validity.

Lately the literature has concentrated on examining the process of MRP implementation and on developing measuring instruments that evaluate this process (Blasingame & Weeks, 1981; Cox et al., 1981). Blasingame and Weeks developed a survey to assess organizational readiness for implementation of an MRP. Although the survey is grounded in theory, its 1-item scales are problematic because they prohibit the calculation of any index of reliability—a necessary condition for establishing a measuring instrument's validity (Nunnally, 1978). Cox and colleagues developed an MRP audit instrument to assess the two dimensions of successful implementation, derived from Schultz

and Slevin (1975), that their model identified. They wrote that successful implementation

is viewed as a dual construct involving technical validity and organizational validity. Technical validity refers to the capability of the information system to function as required; . . . organizational validity refers to the compatibility of the information system with the emotional, political, and cultural realities of the organization (Cox et al., 1981: 388).

Their instrument's measure of technical validity assesses the existence of functional and supporting subsystems that are necessary to implement an MRP effectively. Questions are diagnostic rather than attitudinal and require simple yes/no responses. Five technical areas are evaluated: technical design, master scheduling/capacity planning, information quality, inventory management, and rescheduling. The instrument measures organizational validity along five subdimensions: support of the system/resistance to change, communication, user education, user participation, and complexity of design. The questions are attitudinal and have 6-point response formats.

Cox and colleagues administered their MRP audit instrument to 18 respondents from a manufacturing firm that had implemented an MRP system. Results indicated that the technical system was not properly designed and that employees perceived the system as too complicated and difficult to use. Like previous researchers, these authors did not report any evidence to substantiate the validity or reliability of their instrument.

In summary, it is apparent that past research is based predominantly upon case studies and measuring instruments that lack any evidence of validity. The present research attempted to address this problem by examining the content validity of Cox and colleagues' construct of organizational validity from two perspectives. Study 1 follows a judgmental approach, and study 2 a factor analytical approach. Additionally, study 2 assessed reliabilities for the subdimensions within both the organizational and technical validity constructs.

STUDY 1

One way to determine whether a set of items represents a defined domain of content is to have a panel of experts assign test items to the theoretical facets underlying the content domain (American Psychological Association, 1985). If the items represent the specified content domain, judges should correctly assign items to the facets or dimensions in which they belong. Lack of agreement indicates that either the items are not independent or that they are measuring extraneous content.

Methods

Sampling and procedures. A questionnaire was sent to 38 members of the American Production and Inventory Control Society and to six academics specializing in operations management. These individuals returned 26 questionnaires, resulting in a response rate of 59 percent.

The questionnaire asked respondents to assign each of the 74 randomly ordered items composing Cox and colleagues' organizational validity construct into one of the following categories: (1) support of the system/resistance to change, (2) communications, (3) personnel/user education, (4) user participation, (5) complexity of design, (6) none of these, and (7) more than one of these. Cox and his coauthors proposed that the first five categories represented the theoretical dimensions underlying organizational validity. The questionnaire included detailed definitions based on descriptions provided by Cox and colleagues for each dimension.

Analysis. Choices for each of the seven theoretical categories for each of the 74 items were totaled. The normal procedure is to discard items when 50 to 60 percent of judges do not assign them to the specific theoretical dimension in which they belong (cf. Bernardin, 1977; Bernardin, LaShells, Smith, & Alvares, 1976), because a lack of agreement indicates that an item is not measuring what it is purported to measure. We used a more lenient criterion, discarding items only when 50 percent of respondents assigned them to no theoretical dimension because only two items were correctly assigned to their specific dimensions using the more demanding criterion.

Reliability of judges was assessed through a procedure developed by Schriesheim, Kinicki, and Schriesheim (1979). First, we randomly divided respondents into two groups. Then, we computed the number of times that each of the 74 items was assigned to each of the seven dimensions for both groups. For each of the seven dimensions, correlations were then calculated between the two groups of judges across the 74 items.

Results and Discussion

Table 1 shows the 29 items that at least 50 percent of the judges assigned to a dimension. Percentages ranged from 50 to 77, indicating relatively low agreement. Items 9 and 24 were the only ones correctly assigned to the dimensions specified by Cox and colleagues. Moreover, the judges believed that items 5, 10, 16, 26, and 27 measured constructs not contained within the theoretical domain those authors specified. For dimensions 1 through 7, reliability coefficients were .71, .78, .88, .77, .85, .91, and .48, respectively. Comparing the percentages reported in Table 1 with the estimates of reliability reveals that judges consistently assigned specific items to similarly incorrect subdimensions. On a theoretical level, these results indicate that the subdimensions of the organizational validity construct lack content validity. Judges consistently agreed that items did not measure the theoretical dimensions that they were purported to measure.

STUDY 2

The purpose of study 2 was to identify the dimensions underlying the 29 items listed in Table 1 through factor analysis. We did not use the remaining 45 items in any subsequent analyses, because the judgmental analysis revealed that these items did not represent any clearly identifiable facet of the content domain.

TABLE 1
Results of Judges' Assignments and
Factor Analysis of Employees' Responses

Items	Study 1		Study 2			
	Percentage of Judges Making Assignments	Theoretical Dimensions ^a	Factors			
			1 ^b	2	3	4
1. MRP will work in our organization.	50	7	.77	-.09	-.07	.11
2. The MRP system enables me to perform my job better.	54	2	.75	-.02	.11	.08
3. I need the information MRP provides.	65	5	.63	.05	.23	.08
4. MRP requires unlearning old work methods and acquiring new work methods.	58	4	.62	.06	.10	-.08
5. MRP is more useful than the previous system.	54	6	.58	-.05	-.21	-.02
6. I am satisfied with the MRP system.	50	5	.55	-.14	-.02	.38
7. The MRP system designers understand the users' informational needs.	54	5	.46	-.34	-.01	.27
8. The users are capable of communicating their information needs to the MRP design team.	54	1	.43	-.31	.15	.15
9. The personnel on the MRP design team have a low turnover rate.	50	2	.10	-.71	-.01	-.01
10. Too many people were on the MRP design team.	54	6	.10	-.62	.18	-.13
11. The MRP users had several options to choose from during the design stage.	58	5	.13	-.62	.28	-.03
12. Adequate time was allowed for the design of the MRP system.	62	3	.21	-.60	.05	.12
13. The information I need to perform my job is lost among excessive information.	77	4	.07	-.07	.61	.02
14. Some of the MRP system reports that I receive are difficult to understand.	50	2	.23	-.20	.54	-.02
15. It is difficult to report transactions of the manufacturing process on a timely enough basis to effectively control operations.	62	4	-.05	-.07	.45	.10
16. The MRP system has produced stress between certain areas of the organization.	77	6	.09	-.15	.37	-.14

TABLE 1 (continued)

Items	Study 1		Study 2			
	Percentage of Judges Making Assignments	Theoretical Dimensions ^a	Factors			
			1 ^b	2	3	4
17. The MRP system is easy to use.	62	3	.19	.03	-.02	.78
18. The MRP system is simple and easy to understand.	50	2	.20	.04	-.02	.71
19. MRP changes social relations within the work environment.	65	2	.34	-.25	.25	-.12
20. MRP aids others more than myself.	54	2	.00	.04	.08	-.17
21. The computer was introduced to replace people.	62	5	-.13	-.02	.39	-.08
22. There is a gap in the levels of formal education between users and data processing.						
23. MRP system users have little computer experience.	54	5	.09	-.23	.18	-.09
24. There is conflict between user values, management values, and data processing values.	58	5	.12	-.07	.07	.01
25. I understand other MRP users' duties.	62	2	.03	-.36	.24	-.11
26. Most of my knowledge about our MRP system came from on-the-job experience rather than from formalized training sessions.	50	1	.38	-.29	-.08	.21
27. The MRP users in my department do not work well with the MRP system design team.	73	6	.00	.19	.17	.17
28. Design of the MRP system required little of my time or effort.	50	6	-.12	-.38	.28	-.05
29. The MRP system is more complex now than when implemented.	69	3	.00	.06	-.02	.12
Eigenvalues	65	4	-.03	-.33	.00	.13
			4.73	2.53	1.33	1.22

^a Numbers correspond to the following: (1) support of the system/resistance to change, (2) communications, (3) personnel/user education, (4) user participation, (5) complexity of design, (6) none of these, and (7) more than one of these.

^b Items that define factors are printed in boldface.

Methods

Sampling and procedures. Random samples of 320 and 46 employees were taken from such functional areas as production control, inventory control, and manufacturing in two high-tech manufacturing firms located in the Southwest. We took the random sample from these areas because employees in them had daily involvement with their companies' MRP systems. Their positions were typical of those positions having high levels of interaction with MRP systems in organizations in general and in these companies in particular. Since the two firms produced similar products, and preliminary analyses revealed no significant differences on age, gender, and work experience of respondents, we based all analyses on the combined samples. A 79 percent combined response rate yielded a usable sample size of 291. Respondents' average age was 37 years, and 43 percent were men. Average organizational tenure was seven years, and three years was the average length of time respondents had held their current positions.

Cox and colleagues' technical validity construct was applicable to only one of the two sites, because it deals with system design issues that are only relevant to system design, certain high-level management, and technical staff positions. Of 75 recipients, 53 returned the questionnaire. Respondents' average age was 36 years, and 68 percent were men. Average organizational tenure was nine years, and three years was the average length of time respondents had held their current positions.

Measures. Participants completed 29 items from Cox, Zmud, and Clark's organizational validity construct (see Table 1). Responses were obtained on 6-point format ranging from 1 = strongly agree to 6 = strongly disagree. We also included unknown as a response category, treating such responses as missing data.

The technical validity construct consisted of 64 questions with a yes/no response option. Sample items are: shop orders are developed from information provided by the MRP system; a formal master scheduling procedure is used; and inventory records have at least 95 percent accuracy. For a complete list of the items see Clark, Cox, Jesse, and Zmud (1982).

Analysis. A factor-analytic computer program developed by McKelvey (1969) was used to analyze the data. This program integrates item analysis with factor analysis through an algorithm that maximizes the internal consistency of the factors and minimizes intercorrelations. Data were initially factored by the principal axes method followed by a varimax rotation (Harman, 1976). The test of eigenvalues > 1.00 was used to determine the number of factors to rotate. The next step consisted of picking a criterion for determining which items defined a factor. To accomplish this objective, all loadings in the factor matrix were raised to the fourth power, emphasizing higher loadings. We considered an item to define a factor when its loading on a particular factor was three times greater than its loadings on all other factors. McKelvey demonstrated that this procedure is superior to several other alternatives. We then conducted an iterative process that successively deletes items with the lowest loadings from each factor. For each iteration, the final

output contained estimates of reliability (α) for each factor along with correlations between factors. We used KR-20 (Kuder & Richardson, 1937) to estimate reliabilities for the dichotomous variables contained in the measure of technical validity.

Results and Discussion

Table 1 shows results of the factor analysis. On the basis of the eigenvalue-greater-than-one test (Cattell, 1952; Harman, 1976), the data were represented by four underlying factors. We used the item-analysis component of McKelvey's (1969) program to identify those items that reliably defined the underlying factor structure, presented in Table 1, and based interpretations of the derived factors on this analysis.

This analysis indicated that items 1, 2, 3, 4, 5, and 6 best represented Factor 1 ($\alpha = .81$). We concluded that items 7 and 8 did not define Factor 1, because they produced high cross-loadings with Factor 2, and because their inclusion did not appreciably increase the reliability of the first factor. The content of items 1 through 6 ranges from satisfaction to the need for a system; this factor may be interpreted as a measure of a system's usefulness. Although this dimension represents a potentially important construct to assess when evaluating an MRP, it is not within the theoretical domain of content Cox and colleagues defined. Further, items defining this factor are drawn from two different theoretical dimensions of their original instrument, support of the system and user participation.

Consistent with the item loadings presented in Table 1, items 9, 10, 11, and 12 optimally defined Factor 2. Since these items describe both design teams and design processes, we labeled this factor system design process ($\alpha = .75$). As with Factor 1, Factor 2 did not clearly match any of the theoretical dimensions thought to underlie the construct of organizational validity. In addition, items composing Factor 2 came from both the communication and user-participation subdimensions of the original instrument.

Although item analysis identified items 13, 14, 15, 16, and 21 as best representing Factor 3, we are hesitant to interpret this factor for three reasons. First, the items come from three different theoretical dimensions identified by Cox and colleagues: complexity (items 13 and 15), support of system (items 16 and 21), and personnel/user education (item 14). Second, the value of coefficient alpha for this factor (.59) was well below the acceptable level for basic research (.70) Nunnally (1978: 245) suggested. Finally, as a cohesive set, the items do not clearly define any specific content domain.

Items 17 and 18 defined Factor 4 ($\alpha = .76$), which appears to measure the theoretical dimension of complexity. Both of these items came from Cox and colleagues' dimension of complexity.

The analysis of the reliabilities of the technical validity section of the questionnaire revealed acceptably high values for all five scales. For the scales for system design, master scheduling/capacity planning, information quality, and inventory management, $\alpha = .88$. For the rescheduling scale, $\alpha = .78$. All of these are above the minimum level of reliability suggested by

Nunnally (1978); however, although such results are encouraging, it is important to note that reliability is a necessary, but not sufficient, condition of validity (Kerlinger, 1973).

SUMMARY AND FUTURE DIRECTIONS

Results revealed that Cox, Zmud, and Clark's organizational validity scale lacked content validity. All was not lost, however, because results from Study 1 suggested that 29 of the original 74 items represented some sort of identifiable content. In attempting to define this content domain through factor analysis, Study 2 demonstrated that 17 of these items defined three underlying factors: system's usefulness, system design process, and complexity. We advise researchers to use items measuring these factors rather than the original 74 items. As these dimensions were empirically derived, future research should attempt to further investigate their construct, predictive, and concurrent validity. Moreover, although the subdimensions of the technical validity construct yielded adequate reliabilities, future research is needed to evaluate the validity of this construct as well.

In a global sense, future research should also develop and validate additional MRP auditing instruments. Such measures are needed not only to demonstrate convergent and discriminant validity of the presently identified dimensions, but also to evaluate other components of MRP implementations such as staffing levels and forecasting systems, as White and associates (1982) noted. It is important that the development of additional measuring instruments be firmly grounded in a theoretical model of the process of MRP implementation. As Blasingame and Weeks (1981) and White (1980) suggested, the literature on organizational change might be a logical starting point. Other disciplines have developed theories, tools, and techniques that might serve research on MRP implementation quite well. For example, Fidler and Johnson (1984) discussed the role of communication in effective implementation. An accurate understanding of the true processes of MRP implementation, built on such a foundation, will improve the ability of practitioners to successfully implement such systems.

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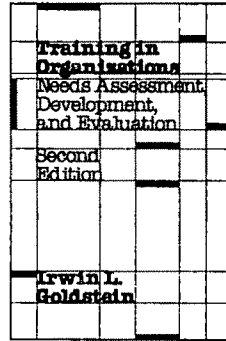
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QUALITY PROBLEMS, POLICIES, AND ATTITUDES IN THE UNITED STATES AND JAPAN: AN EXPLORATORY STUDY

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This study drew on surveys of first-line supervisors in a single, broadly representative industry to compare practices and attitudes concerning quality in the United States and Japan. It focused on two central issues: (1) the changing mix of problems with quality as quality performance improves; and (2) the relationships between management commitment to quality, workforce commitment to quality, pressure to produce goods of high quality, and quality performance.

The quality of products presents both a problem and an opportunity for U.S. manufacturers—a problem, because foreign competitors are often far ahead in offering products of superior quality; an opportunity, because American consumers are increasingly concerned about the quality of the goods and services that they buy (Barksdale et al., 1982; Center for Policy Alternatives, 1978; *New York Times*, 1983). The result has been a heightened interest in the management of quality at many U.S. companies (Miller, Nakane, & Vollman, 1983: 7-8).

Much of the interest has focused on three areas: Japanese approaches to quality management (Juran, 1978; Schonberger, 1982), the application of various statistical techniques (Gitlow & Hertz, 1983; Wood, 1981), and the development of formal programs to improve quality (Crosby, 1979; Feigenbaum, 1961). Most studies have taken a prescriptive approach, outlining the steps to be followed in correcting problems with quality. Few, however, have paused to analyze the causes of those problems.

Quality problems might arise from a number of sources, including poor designs, defective materials, shoddy workmanship, and poorly maintained equipment. There is little evidence as to whether the mix of these problems is the same at companies with different levels of performance. Do companies with poor quality face the same problems as those with superior quality? Do

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Japanese companies face the same set of problems as American firms? These issues are important because they have a direct bearing (1) on the policies companies should adopt in trying to improve their quality, and (2) on the relevance of Japanese approaches to quality management for U.S. companies.

Similarly, there has been much debate, but little systematic evidence, on the relative responsibilities management and labor have for improving quality. For example; many analysts agree that a necessary condition for successful quality performance is a management dedicated to that goal (Crosby, 1979: 7-8; Juran, 1978: 16; Leonard & Sasser, 1982: 168). Support for this claim, however, is primarily anecdotal. Studies relating management attitudes to quality performance are rare. There is a similar lack of evidence on the association between workforce attitudes and quality performance. Although a small number of studies have dealt with the subject, they have produced conflicting results (Adam, Hershauer, & Ruch, 1981: 154-155).

This study used data from a single, broadly representative industry—room air conditioning—to explore the causes of quality problems and the contributors to quality performance in the United States and Japan. It focused on two issues: the changing mix of problems as performance improves, and the relationship between managements' policies, workers' attitudes, and performance. For the most part, this presentation is exploratory and descriptive. Rather than deriving and testing formal hypotheses, it focuses on whether new, relatively systematic data support assorted speculations, observations, and predictions scattered in the literature.

FIRST-LINE SUPERVISORS AS RESPONDENTS

One reason for the paucity of evidence on these topics has been the difficulty of securing reliable and representative data. Few companies keep comprehensive records of the causes of their problems with quality; still fewer periodically assess their organizations' commitments to quality. Although such data might be collected through surveys, the possibility of bias remains. For example, the responses of workers and managers to questions about the causes of their companies' quality problems are likely to reflect some degree of self-interest. Choosing well-informed, but somewhat impartial respondents might reduce such bias. In this study, first-line supervisors (foremen) were surveyed (1) because of their unique organizational position, midway between management and labor, and (2) because of their familiarity with the day-to-day activities of production, which should give them good insight into the causes of problems with quality.

Officially members of management, first-line supervisors are frequently characterized as men in the middle, with little clear allegiance to either management or labor (Driscoll, Carroll, & Sprecher, 1978; Roethlisberger, 1945). An early study concluded that first-line supervisors "do not share in the decision-making process which is the core of managerial functions" (Wray, 1949: 298); a more recent survey found that only 35 percent of first-line supervisors felt that they were "a real part of company management"

(Bittel & Ramsey, 1982: 27). Nor do supervisors identify closely with the rank-and-file. After reviewing several studies on this topic, Schlesinger and Klein concluded that "supervisors are still . . . walking the tightrope between management and workers" (1982: 29).

As a result, supervisors are likely to be less biased observers of the causes of quality problems than either management or labor. They are also in an excellent position to report on management's real priorities: the messages that are communicated daily, both verbally and formally through evaluation and control systems, to shopfloor employees, and that sometimes conflict with management's public proclamations. Because of their contact with workers, supervisors are also likely to be reasonably accurate judges of their attitudes.

Japanese supervisors, however, may have different perspectives on these issues than American supervisors. In Japan, first-line supervisors tend to identify more closely with workers than with management, although split loyalties can also be found (Cole, 1971: 186; Nosow, 1981). In part, this reflects the process that Japanese firms use to select supervisors, drawing them from the general pool of workers. Great weight is attached to the respect that workers receive from their peers. Japanese supervisors are also frequently members of a company's union, which produces further pressures to side with the workforce (Munchus, 1983: 259). In the United States, such membership is prohibited by law. Finally, Japanese supervisors are often better trained in the techniques of quality analysis and problem solving than their U.S. counterparts, and they have been taught to recognize problems, such as design flaws and faulty incoming materials, that originate outside their immediate work areas (Cole, 1979: 137-138; Juran, 1981: 10-13).

These differences have important implications for the expected responses of U.S. and Japanese supervisors to questions about quality. Divergence is especially likely on questions about the sources of a company's quality problems, because supervisors' responses must be interpreted as attributions in such cases. That is, with incomplete information at their disposal, supervisors are being asked to infer causality (Berkowitz, 1980: 202-213; Brown, 1986: 133-194; Fishbein & Ajzen, 1975: 45-52, 188-215). As Brown pointed out, in such circumstances "the perceptually salient factor . . . is . . . generally the factor assigned the larger causal role" (1986: 193). For this reason, differences in the training of U.S. and Japanese supervisors might affect their interpretations of the causes of problems with quality in their countries by affecting the salience of such factors as the quality of product designs and of incoming parts and materials. In the same vein, differences among U.S. and Japanese supervisors as to their degree of identification with the workforce might affect the proportion of quality problems they attribute to poor workmanship; according to Brown, "if an observer is made to share the perspective of the actor, he will attribute causality not to the actor, but as the actor does" (1986: 194). These issues will be considered further when supervisors' responses are reported and discussed.

RESEARCH QUESTIONS

Attention to Production

The great emphasis that Japanese companies place on the process of manufacturing and on labor relations is now widely acknowledged. Support comes from a variety of field studies by both business scholars and sociologists (Abernathy, Clark, & Kantrow, 1983; Cole, 1971, 1979; Dore, 1973; Hayes, 1981; Marsland & Beer, 1983; Schonberger, 1982; Wheelwright, 1981). According to these studies, most Japanese manufacturers pay great attention to control of processes, design and maintenance of equipment, housekeeping, product handling, and other aspects of production that might affect quality, perhaps adversely. Manufacturing excellence is viewed as an important goal. Informed observers also suggest that most Japanese companies are strongly committed to continuing improvement in their operations (Cole, 1983: 11). Defect rates are closely monitored, often with the aid of statistical techniques; unanticipated problems result in formal analysis and remedial action. The goal of this activity is the accumulation of knowledge that will lead to a reduction in process-related errors.

In the United States, manufacturers have directed less attention to these issues. Anecdotal evidence suggests that many U.S. firms have adopted statistical controls only recently (Main, 1980: 30–31; Rohan, 1983: 72–79). Defect rates are evaluated against “acceptable quality levels” rather than against standards of continual improvement (Cole, 1983: 11; Hayes & Wheelwright, 1984: 362–363), and fine-tuning of production processes is a secondary concern. In the opinion of several leading business scholars, U.S. companies seldom regard manufacturing excellence as a top management priority (e.g., Hayes & Abernathy, 1980: 68–69, 77).

Japanese companies also place greater emphasis on workforce involvement and harmonious labor relations than do most American companies. Their use of quality control circles for problem solving is one example of this approach (Munchus, 1983; Takeuchi, 1981: 9–13); another, observed in numerous field studies, is their interest in bottom-up communication and consensual decision making (Marsland & Beer, 1983: 52–53, 65). Moreover, because Japanese unions are aligned with individual companies, they have an important stake in the future of their firms. The result is a supportive and cooperative workforce that identifies closely with corporate goals.

These considerations suggest that Japanese companies will face fewer quality problems that arise from deficiencies in production management or in workmanship than will comparable U.S. companies. They are also likely to experience a smaller proportion of problems in these categories. Although Japanese companies are now pursuing quality improvements in areas removed from production, such as vendor management and product design (Cole, 1981: 31–32; Garvin, 1983: 71–73), their earliest efforts concerned process and workforce. The history of the Japanese quality movement suggests that the techniques of statistical process control, manufacturing management, and worker involvement in problem solving were the primary bases for

Japan's post-war improvement in quality (Cole, 1979: 135–137; Kume, 1980: 21–24). Attention to vendors and designs came more recently, with the advent of the total quality control and company-wide quality control movements. Because Japanese companies have devoted so much time to aspects of quality related to process and workforce, they are likely to experience a smaller proportion of quality problems in these areas, especially when compared with U.S. firms.

Commitment to Quality

For similar reasons, U.S. and Japanese managers and workers are likely to be committed to quality improvement to differing degrees. Again, a brief history is instructive. When the techniques of statistical quality control were first introduced in Japan, they were accompanied by a massive training program (Hopper, 1982: 19–29; Juran, 1981: 10–13). Most early efforts focused on upper management. These training programs were well attended, and the principles of quality control were quickly disseminated. Among the principles emphasized were the close connection between quality improvement, gains in productivity, and reduction of costs, as well as the desirability of focusing on quality improvement to motivate employees (Cole, 1983: 9–10; Tribus, 1982, 1983; Tribus & Hollomon, 1982). A number of success stories demonstrated the usefulness of this approach, which soon became the standard for much of Japanese industry and the driving force behind managers' efforts to upgrade manufacturing. Firms later established training programs to teach the same principles to foremen and production workers. Several business scholars with first-hand experience in Japan have concluded that, once these principles gained wide acceptance, a strong commitment to quality emerged (Hayes & Wheelwright, 1984: 361–363; Juran, 1978, 1981).

Anecdotal evidence suggests that at many U.S. companies, a different ethic developed (*Business Week*, 1982: 66–69; Leonard & Sasser, 1982: 164–166). In the United States today, quality is often considered secondary to other goals. Few managers or workers are trained in the principles of quality control, and the connection between quality, productivity, and cost is often poorly understood. In these circumstances, the commitment of managers and workers to improving quality is likely to be much weaker than it is at comparable Japanese companies.

Control Systems

High levels of commitment might be sustained by a number of measures, including programs to inculcate values, extensive training, and tight evaluation and control systems. Several descriptive studies have emphasized the success of Japanese companies in influencing employees' behavior through statements of company philosophy and values (Ouchi, 1981: 47–51; Pascale & Athos, 1981: 49–52, 177–199). Because these statements frequently stress the importance of quality, formal controls may play a lesser role. As Ouchi (1979: 836–838, 841) pointed out, in the presence of widely shared values and beliefs, clan controls often dominate, rather than market or bureaucratic

mechanisms. This would suggest that Japanese supervisors will be less frequently evaluated against formal quality goals than will American supervisors, and might experience less day-to-day pressure to meet specified performance standards. Pressure to perform, however, is a subjective phenomenon: it reflects employees' perceptions of the stresses they endure. Workers and supervisors may perceive the strong informal controls employed by Japanese companies as creating great pressures for improvement, even in the absence of formal targets. An emphasis on continual improvement, rather than the acceptable quality levels typical of American firms, could well reinforce such feelings. For these reasons, it is difficult to predict *a priori* whether Japanese workers and supervisors will feel themselves to be under more or less pressure to improve quality than their U.S. counterparts.

A Quality Spectrum

Thus far, all comparisons have been between U.S. and Japanese companies. Within the United States, however, firms in a single industry might also differ in quality performance. The arguments of the preceding sections can be extended to assessments that are independent of culture through the notion of a quality spectrum, along which firms can be ranked in descending order of their performance on quality. The prediction would then be that policies and attitudes concerning quality will covary with levels of quality performance.¹

This idea has not appeared explicitly in the literature, but it is closely related to two claims: that management practices and priorities, rather than national or cultural traits, primarily explain Japan's manufacturing success; and that such practices and priorities are lacking or attenuated at many U.S. firms (Garvin, 1983, 1984; Hayes, 1981: 57–58; Schonberger, 1982: 14; Wheelwright, 1981: 68). By implication, this argument suggests that companies with superior quality, whether Japanese or American, will share common features—for example, managers and workers who are strongly committed to improving quality. As long as such attitudes vary along a continuum, companies with slightly lower quality performance should display slightly lower levels of commitment among management and workforce. Similar reasoning can be applied to other policies and attitudes concerning quality.

In summary, a review of the literature suggested four major research questions:

- (1) *Does the mix of quality problems differ in the United States and Japan?*
- (2) *Do Japanese managers and workers display a greater commitment to quality than U.S. managers and workers?*

¹ The idea of a quality spectrum is not meant to imply that all of the factors contributing to quality covary together, but only that general patterns may exist. For example, necessary conditions for superior performance on quality need to be distinguished from both supportive but unessential conditions and from sufficient conditions.

(3) *Do Japanese workers face greater pressure to improve quality than U.S. workers, and does this reflect different control systems?*

(4) *Do policies and attitudes concerning quality covary along a spectrum of quality performance?*

METHODS

To explore these questions, survey responses were collected from first-line supervisors at U.S. and Japanese manufacturers of room air conditioners. Respondents were confined to a single industry in order to minimize the effects that differences in products and processes might have on results. The room air conditioning industry was selected for study because it contains companies of varying sizes and characters, implying a wide range of quality policies and performance; it also offers relatively standardized products, which facilitates intercompany comparisons, and employs a simple assembly-line process that is representative of other mass production industries.

Nine U.S. companies and seven Japanese companies participated in the study. Plants rather than companies were selected as the units of analysis, because practices differed within firms. Two of the American companies operated two plants apiece; otherwise, each company employed a single plant. In total, 18 plants were involved in the study, 11 of them American and 7 of them Japanese. Together, they accounted for approximately 90 percent of the shipments of room air conditioners in the two countries.

Because this study was part of a larger research project (Garvin, 1983, 1984), all participants received several questionnaires designed to collect background information on the plants' product lines, production practices, vendor management practices, quality policies, and quality performance, while also surveying the attitudes of first-line supervisors. Cooperation was obtained by first writing a letter to each company's president or vice president of manufacturing, explaining the purpose of the research and promising that a complete set of industry statistics would be provided once the study was completed. Questionnaires were then sent and site visits arranged, usually of one or two days' duration. The supervisors' questionnaire was an expanded version of a questionnaire first used by Leonard and Sasser (1982: 164); it appears in Appendix A. At U.S. plants, all first-line production supervisors were surveyed; at Japanese plants, surveys were confined to a small sample of production supervisors selected by company management; hence, the sample may not be completely random.² Only six of the Japanese plants agreed to participate in this part of the study. The number of supervisors surveyed at each U.S. plant ranged from 6 to 42, with a median of 16, and the number of supervisors surveyed at each Japanese plant ranged from

² Although sample statistics and tests of significance are reported throughout the paper, it is important to remember that all supervisors were surveyed at U.S. plants. This set of data therefore constitutes a population rather than a sample. Significance tests are difficult to interpret in such circumstances; see Blalock (1972: 238-239) for a brief discussion.

1 to 7, with a median of 6. In Japan, the sample ranged from 4 to 100 percent of all supervisors at the plants, with a median of 19 percent. At all plants, company management administered the first-line supervisors' questionnaire, telling supervisors that the company was participating in an academic study of quality practices, that their honest responses would be appreciated, and that all questionnaires were to be left unsigned. Background data on plants were collected in 1981 and 1982, and all supervisors were surveyed in the last half of 1982.

To aid in interpreting the results, plants were first classified by quality performance. Several measures were employed to insure consistency, for companies did not always employ identical practices in recording information about quality. Appendix B describes the classification scheme, which includes measures of quality assessed both in terms of in-plant failures and failures in the field. Combining these measures resulted in five separate categories of quality performance, which Table 1 summarizes.

RESULTS

The Mix of Quality Problems in the United States and Japan

The supervisors' questionnaire identified eight causes of quality problems: workmanship or workforce; materials or purchased parts; maintenance or adjustment of process or equipment; poor design of process or equipment; poor product design; inadequate systems or controls; management errors, including providing insufficient instructions to the workforce; and other. Supervisors were asked to assign percentages to each category on the basis of their rating of its importance as a cause of their companies' quality problems. All figures were to total 100 percent. Because of this last requirement, supervisors' responses in each category are not statistically independent; in such circumstances, *t*-tests cannot be used to compare U.S. and Japanese

TABLE 1
Medians for Quality Performance by Overall Quality Ratings

Ratings	Internal Failures ^a	External Failures ^b	Number of Plants	Number of Supervisors
Japanese manufacturers	0.95	0.6	7 ^c	29
Best U.S. plants	9.00	7.2	2	24
Better U.S. plants	26.00	10.5	3	88
Fair U.S. plants	63.50	9.8	3	40
Poor U.S. plants	135.00	22.9	3	47

^aAssembly-line defects per 100 units.

^bService calls per 100 units under first-year warranty coverage. U.S. service call rates normally include calls where no product problems were found; Japanese rates do not. Most U.S. medians were adjusted to exclude these calls, but the data were unavailable for the poor U.S. plants. For the rest, such calls averaged 2.3 per 100 units under the first year of warranty coverage.

^cOnly six of these plants returned completed supervisors' questionnaires.

results. Moreover, focusing on mean values alone ignores valuable information about the distribution of responses in the two countries. For these reasons, Table 2 presents data on the causes of quality problems in the form of interquartile ranges, and the Kruskal-Wallis *H*-test, a nonparametric alternative to the analysis of variance that is calculated from ranks, is used to test for significance.

The data in Table 2 help address the first research question, which concerns the mix of quality problems in the United States and Japan. In two categories—problems due to poor product design and problems due to materials or purchased parts—Japanese supervisors consistently assigned higher percentages than did U.S. supervisors. In two other categories—problems due to workmanship or workforce and problems due to maintenance or adjustment of processes or equipment—U.S. supervisors consistently assigned higher percentages. On the basis of a one-tailed Kruskal-Wallis *H*-test corrected for ties, all four of these differences were significant ($p < .001$). In the remaining categories, differences were far smaller, although in the case of inadequate systems or controls and other, the differences were significant ($p < .05$) with the same Kruskal-Wallis *H*-test.³

Japanese supervisors thus attributed a much smaller proportion of their companies' quality problems to factors related to process and workforce and much more to such outside factors as product design and incoming parts and materials. These results are consistent with the hypothesis, advanced earlier in this paper, that the mix of quality problems in the two countries is different, with the Japanese experiencing fewer problems caused by deficiencies in production management. But the results are also consistent with the view that Japanese and American supervisors differ in their attributions of the causes of problems because of differences in training and in degree of identification with the workforce. From these data alone, it is impossible to distinguish between the two interpretations.

Attitudes and Policies on Quality in the United States and Japan

Table 3 presents the responses of U.S. and Japanese supervisors to questions about their companies' policies and attitudes concerning quality. Since the data do not involve interrelated percentages, the assumption of statistical independence is not violated. However, because ordinal data are involved and responses may not be normally distributed, nonparametric tests have

³ A further question about the validity of supervisors' responses must be addressed. Is the within-firm variation in responses so large that it suggests the data are very subjective, or are real differences being observed? To check on this problem, a one-way analysis of variance with firms as the classifying variable was run on every question to compare the variation in responses within firms to the variation across firms. In all but two cases—the percentage of supervisors evaluated on defect rates and the percentage of supervisors evaluated on other measures—the resulting *F*-values were statistically significant (usually, $p < .01$). These findings show that supervisors within the same firms were reacting to similar phenomena. Virtually identical results were obtained when Kruskal-Wallis *H*-tests or chi-square statistics were used to compensate for possible lack of independence or of normality in the data, or for the presence of nominal variables.

TABLE 2
Supervisors' Perceptions of the Causes
of Their Companies' Quality Problems

Percentages Assigned to Causes of Quality Problems	Percentages of Supervisors Making Attributions ^a		Kruskal-Wallis H-Values
	Japan	United States	
Workforce/workmanship			22.0**
0 - 24	89.7	56.6	
25 - 49	10.3	32.3	
50 - 74	0.0	10.6	
75 - 100	0.0	0.5	
Materials/purchased parts			12.4**
0 - 24	55.2	82.5	
25 - 49	31.0	14.3	
50 - 74	13.8	3.2	
75 - 100	0.0	0.0	
Maintenance/adjustment of process or equipment			16.2**
0 - 24	93.1	76.2	
25 - 49	3.4	20.1	
50 - 74	3.4	3.2	
75 - 100	0.0	0.5	
Poor design of process or equipment			3.2
0 - 24	96.6	89.9	
25 - 49	0.0	7.9	
50 - 74	3.4	2.1	
75 - 100	0.0	0.0	
Poor product design			27.3**
0 - 24	55.2	90.5	
25 - 49	17.2	7.9	
50 - 74	20.7	1.6	
75 - 100	6.9	0.0	
Inadequate systems or controls			5.0*
0 - 24	93.1	91.5	
25 - 49	6.9	7.9	
50 - 74	0.0	0.5	
75 - 100	0.0	0.0	
Management errors, including providing insufficient instructions to the workforce			2.7
0 - 24	96.6	92.1	
25 - 49	3.4	7.9	
50 - 74	0.0	0.0	
75 - 100	0.0	0.0	
Other			5.8*
0 - 24	100.0	99.5	
25 - 49	0.0	0.5	
50 - 74	0.0	0.0	
75 - 100	0.0	0.0	
Number of supervisors	29	199	

^aTo be read as follows: 89.7 percent of all Japanese supervisors attributed 24 percent or less of their companies' quality problems to workforce/workmanship; 10.3 percent of all Japanese supervisors attributed 25-49 percent of their companies' quality problems to workforce/workmanship. Columns may not add to 100.0 percent due to rounding.

* $p < .05$, one-tailed test of significance.

** $p < .001$, one-tailed test.

TABLE 3
Comparison of U.S. and Japanese Supervisors' Evaluations
of Attitudes and Policies Concerning Quality

Survey Questions	Mean Scores ^a		H or χ^2 values ^b
	Japan	U.S.	
Attitudes towards quality			
Weight that management attaches to the following manufacturing objectives			
• producing high-quality (defect-free) products	6.7	5.9	9.6**
• low-cost production	6.2	5.9	2.7*
• improving workers' productivity	6.2	5.8	2.9*
• meeting production schedules	6.1	6.5	9.4**
Degree to which company's production workers care about product quality	5.8	4.9	12.2**
Policies on quality			
Degree to which supervisors feel pressure to improve quality	5.7	6.1	2.9*
Percentage of supervisors held responsible for			
• defect rates in their areas	76	78	0.0
• amount of rework performed by workers in their areas	31	77	24.5**
• scrap costs in their areas	17	80	46.2**
• other quality measures	48	28	3.9*
Percentage of supervisors who have seen the formal quality statements of their companies	86	64	4.0*
Number of supervisors	29	199	

^aItems were scored from 1 to 7, with 1 indicating lower performance, less weight attached to that objective, etc., and 7 indicating higher performance or greater weight attached to that objective.

^bKruskal-Wallis H-values have been reported for all questions except those involving percentages, which are based on counts of the number of supervisors responding yes to the question, and for which χ^2 -statistics are therefore more appropriate.

* $p < .05$, one-tailed test of significance.

** $p < .001$, one-tailed test.

again been used. These data bear directly on the second research question, which concerns the degree of commitment to producing goods of high quality that U.S. and Japanese managers and workers display. Japanese supervisors perceived producing high-quality (defect free) products to be the objective accorded the greatest weight among their managements' four primary manufacturing objectives. In the United States, supervisors believed that managers placed more emphasis on meeting production schedules; this was the only manufacturing objective that received a higher score in the United States than in Japan. A similar disparity is evident in supervisors' ratings of the degree to which their companies' production workers cared about product quality. Here again, the Japanese scored significantly higher.

These findings suggest a basic difference between U.S. and Japanese approaches to manufacturing. Companies in both countries appear to be driven by single dominant goals, but the goals differ. In the United States, it is meeting a production schedule; in Japan, it is producing defect-free products. These goals were ranked well above other manufacturing objectives in each country. A one-tailed Wilcoxon matched-pairs ranked-signs test was used to compare scores because paired ordinal data from a single sample were involved. The differences between the dominant goal and the goals that were ranked second, third, and fourth in each country were statistically significant in both Japan ($p < .05$) and the United States ($p < .01$).

Table 3 also has a bearing on the third research question, concerning the extent of pressure that U.S. and Japanese supervisors feel to improve quality and the control systems that are employed. As expected, Japanese companies in the study relied more heavily on statements of company philosophy, and U.S. companies relied more often on formal evaluations against rework, scrap, and defect goals; on the last, however, the difference between the two countries was statistically insignificant. Only where other measures were involved were Japanese supervisors held accountable more frequently than their American peers. To some extent, these findings are likely to be a by-product of the small number of quality problems experienced by Japanese firms in this industry. Defect rates below 1 percent imply extremely low rework and scrap costs; for many companies, such low rates make other measures more useful as quality goals.

Japanese supervisors also reported feeling less pressure to improve quality than their U.S. counterparts. Although this finding is consistent with the Japanese reliance on clan controls, rather than bureaucratic mechanisms, other factors may also play a role. For example, the kinds of pressures required to improve a manufacturing process already under statistical control, which is the case at many Japanese companies, may differ from the kinds of pressure required to bring a process under control in the first place, which is the situation at many U.S. companies. The type and amount of pressure exerted might therefore be a direct outgrowth of the type of quality improvement required.

Variations Along the Quality Spectrum

Table 4 presents U.S. supervisors' responses to questions about policies and attitudes on quality grouped by their companies' quality performance. All performance categories are drawn from Table 1. These groupings permit an analysis of the quality spectrum and a look at whether policies and attitudes concerning quality covary with levels of performance. The evidence on this point is mixed. In several of this table's categories, supervisors at the best and worst U.S. performers reported differences between their companies as to practices and attitudes concerning quality. Few of these differences, however, were statistically significant. The response of supervisors at the better and fair U.S. plants also failed frequently to conform to the predicted pattern. For example, the proportion of supervisors evaluated on

TABLE 4
Evaluations of Attitudes and Policies Concerning
Quality for U.S. Supervisors

Survey Questions	Means for U.S. Plants				H or χ^2 values ^a
	Best	Better	Fair	Poor	
Attitudes towards quality					
Weight that management attaches to the following manufacturing objectives					
• producing high-quality (defect-free) products	6.2	6.1	5.7	5.4	10.4*
• low-cost production	6.4	5.8	5.5	6.0	9.1*
• improving workers' productivity	6.3	5.9	5.4	5.5	8.6*
• meeting production schedules	6.5	6.5	6.5	6.4	0.8
Degree to which company's production workers care about product quality	5.2	5.1	4.6	4.5	8.8*
Policies on quality					
Degree to which supervisors feel pressure to improve quality	5.9	6.2	6.4	5.7	14.2**
Percentage of supervisors held responsible for					
• defect rates in their areas	88	74	80	79	2.2
• amount of rework performed by workers in their areas	88	75	74	79	2.0
• scrap costs in their areas	92	82	74	75	3.7
• other quality measures	42	32	18	23	5.4
Percentage of supervisors who have seen the formal quality statements of their companies	57	64	54	75	5.4
Number of supervisors	24	88	40	47	

^aKruskal-Wallis H-values have been reported for all questions except those involving percentages, which are based on counts of the number of supervisors responding yes to the question and for which χ^2 -statistics are therefore more appropriate.

* $p < .05$, one-tailed test of significance.

** $p < .001$, one-tailed test.

rework, scrap, and defect measures was not significantly higher at the best U.S. plants than at the poorest, nor was the expected covariation visible at intermediate points along the quality spectrum.

In two areas, however, scores did decline monotonically across the entire quality spectrum. Both areas involved attitudes towards quality. The weight that management attaches to producing defect-free products averaged 6.2 at the best U.S. plants, 6.1 at the better U.S. plants, 5.7 at the fair U.S. plants, and 5.4 at the poorest U.S. plants. The degree to which supervisors thought

their companies' production workers cared about product quality declined in a similar fashion, from an average of 5.2 at the best U.S. manufacturers to one of 4.5 at the poorest U.S. plants. Moreover, in each case, the Japanese plants, which showed levels of quality exceeding those of the best U.S. plants, received the very highest scores.

These findings prompt two observations. First, they suggest that where attitudes toward quality are concerned, differences between the best and poorest U.S. performers parallel those noted in Table 3 between Japanese and American manufacturers. In the realm of management priorities and workers' attention, a quality spectrum does in fact appear to exist. But this spectrum is subject to an important qualification. Although the best and worst U.S. performers offer a distinguishable mix of policies and attitudes on quality, the better and fair U.S. plants are much less clearly differentiated. Their scores are often quite close to those of plants in the adjoining quality categories.⁴


Frameworks for Thinking About Quality

Tables 3 and 4 support the view that differences in quality performance are accompanied by differences in the attitudes of workers and management. High levels of quality were associated with strong commitments to that goal, whether the comparison was between U.S. and Japanese manufacturers or among U.S. manufacturers with varying levels of quality performance. In most other areas, however, systematic relationships did not emerge across the entire quality spectrum, especially when the Japanese manufacturers were included. In fact, there is some evidence to suggest that Japanese manufacturers may approach quality problems in a completely different way than their American counterparts. To explore these differences, Table 5 presents intercorrelations of supervisors' perceptions of the causes of their companies' quality problems for U.S. and Japanese supervisors separately. Because supervisors' responses in each category were required to add to 100 percent and are not statistically independent, responses were recoded into ranks, and Spearman rank correlations, rather than Pearson product-moment correlations, were used.⁵ These correlations illustrate the covariation among categories—the likelihood that a supervisor assigning a high or low score to one category has assigned a similarly high or low score to another category. Two findings are especially noteworthy in this table. The percentage of problems that Japanese supervisors attributed to poor process design has a significant positive correlation with the percentage they attributed to poor process maintenance, but the correlation between these two categories is

⁴ Experiments were conducted with two alternative classification schemes: (1) combining better and fair plants into a single category and leaving the other categories unchanged, and (2) combining best and better plants into one category and fair and poor plants into another. Neither method produced significant changes in the results.

⁵ To smooth the data further, responses were recoded into deciles and quartiles and the rank correlations recomputed. These analyses increased the size of the key associations cited in the text, but had few other significant effects.

TABLE 5
Spearman Rank Correlations of Supervisors' Perceptions
of the Causes of Their Companies' Quality Problems

Perceived Causes of Quality Problems	1	2	3	4	5	6	7	8	
1. Workforce or workmanship		-.20*	-.23*	-.40*	-.23*	-.23*	-.13	-.14**	
2. Materials or purchased parts	.10		-.12	-.08	.08	.07	-.11	-.06	
3. Maintenance or adjustment of process or equipment	.46**	-.28		-.06	-.37*	-.05	-.02	-.11	
4. Poor design of process or equipment	.25	-.21	.48*		.32*	.09	-.12	.07	
5. Poor product design	-.33	-.29	-.49*	-.60*		-.07	.03	.10	
6. Inadequate systems or controls	.01	.12	-.03	.10	-.19		.32*	.03	
7. Management errors, including providing insufficient instructions to workforce	.25	.02	.06	-.25	.15	-.17		-.01	
8. Other	-.05	.27	.07	.22	.45**	.23	.09		
	JAPAN								

^aThe upper right triangle presents coefficients for the United States and the lower left triangle presents coefficients for Japan. Numbers of supervisors are 29 for Japan, 199 for the United States.

* $p < .01$, two-tailed test of significance.

** $p < .05$, two-tailed test of significance.

negative and insignificant among U.S. supervisors. By contrast, the percentage of problems that U.S. supervisors attributed to poor process design is positively correlated with the percentage they attributed to poor product design, but the two are negatively correlated among Japanese supervisors.

These findings suggest, quite tentatively, that Japanese and American supervisors may be using different frameworks for organizing their views about quality. Japanese supervisors appear to view the production process in its entirety; both the design and maintenance of equipment are considered part of production, even though they involve different kinds of activities. In the same spirit, problems due to workforce or workmanship and to maintenance of process and equipment—an activity normally viewed as the workforce's responsibility in Japan—were positively and significantly correlated. Among U.S. supervisors, the focus appears instead to be on tasks and activities. Design issues, involving both product and process, form one identifiable category; another, captured by the positive correlation between the

proportion of problems attributed to management errors and the proportion attributed to inadequate systems and controls, involves those tasks that can be clearly ascribed to management failings.

DISCUSSION

The correlations in Table 5, plus the data examined elsewhere in this study, suggest that U.S. and Japanese manufacturers not only face different profiles of quality problems, but may also be approaching the task of quality management quite differently. According to supervisors, the Japanese firms in this sample displayed a strong management commitment to quality, organized their thinking around process control and production management, and had workers who demonstrated a clear concern for quality improvement, even without explicit goals to reduce prevailing levels of rework and scrap. Although these companies still faced quality problems, supervisors believed that most of them arose outside the shopfloor, primarily in the areas of product design and purchased parts and materials.

By contrast, U.S. supervisors attributed the largest proportion of their firms' quality problems to deficiencies in workforce or workmanship. A deep concern for quality was thought to be lacking among workers and also among managers, even though supervisors were frequently evaluated on such measures as defect and scrap rates. Overall, U.S. supervisors believed that quality was a secondary or tertiary objective for manufacturing, lagging well behind the primary goal of meeting production schedules.

Because these responses are attributions, they can be interpreted at another level as well. Taken together, they highlight important differences in supervisors' perceptions of the environments of factories in the United States and Japan. In the United States, many supervisors appear to view factories as closed systems, with the causes of quality problems predominantly internal factors, such as workforce or workmanship, process design, and maintenance. But in Japan, supervisors more clearly recognized the impact on a factory's performance of external factors, such as incoming parts and materials or design of products. Both are given great weight in Japanese quality training, and both were cited by Japanese supervisors as among the leading causes of their companies' quality problems. Such a perspective insures that problems observed in a factory are traced ultimately to their sources—which may be outside its walls—rather than blamed immediately on internal causes. The lack of such understanding among U.S. supervisors may partially explain the high proportion of quality problems they attributed to deficiencies in workforce or workmanship. Workers become obvious candidates for blame when quality problems can be traced to them, but no further back in a production chain.

A comparison of U.S. and Japanese attributions is also helpful in understanding the role and significance of product quality in the two countries. In Japan, a single unequivocal message was communicated to supervisors: product quality is a critical goal that all members of a firm should support. Thus,

Japanese supervisors reported a consistent set of policies and attitudes concerning quality throughout their organizations. Managers emphasized quality as their primary manufacturing objective, policies were formulated and communicated focusing on that objective, and workers displayed a strong commitment to the same goal. The importance of quality was evident at all levels and was seldom in doubt. In the United States, supervisors reported a more mixed picture. Quality received far less emphasis than meeting production schedules, yet supervisors were still evaluated frequently on their performance against goals for rework, scrap, and defects. Workers were thought to have a relatively low interest in quality. Moreover, although written quality policies were available, supervisors had not always read them. Overall, quality at the U.S. companies was seldom the dominant theme, nor was its importance communicated uniformly to the shopfloor. Such mixed messages go a long way toward explaining the large gap in quality performance separating U.S. and Japanese companies in this particular industry.

The same conclusion can be generalized, to a limited degree, to gaps in quality performance within the United States. For example, both management and workforce commitment to quality covaried with shifts along the quality spectrum, with better performers showing higher commitment on both measures. But when other variables were employed, the idea of a quality spectrum received less support, because U.S. plants with the best and worst quality performance reported differences in policies and attitudes concerning quality that were statistically insignificant. Nor did plants in the middle of the quality spectrum fit the expected pattern. On the basis of this evidence, the idea of a quality spectrum remains tentative and requires further research.

These findings have several important implications for managers. First, they confirm the widely held view that high levels of quality performance are accompanied by organizational commitment to that goal. Attitudes appear to be quite important: without a management and workforce dedicated to quality, little is likely to be accomplished. Second, the evidence reported here suggests that attempts by U.S. firms to mimic Japanese quality practices without first adapting them to local conditions are unlikely to be completely successful, even though practices in both countries were originally derived from the same sources. Japanese quality practices have evolved over time; moreover, considerable progress has already been made in solving problems. For these reasons, not only do perceptions of the mix of quality problems differ in the two countries, the framework for thinking about quality appears to differ as well. Third, companies can expect changes in their quality performance to be mirrored by changes in supervisors' attributions. Because of training and shifting attitudes, supervisors are likely to develop new perspectives on the causes of their companies' quality problems as their actual levels of quality improve. Finally, the results of this study underline the wide gap between the best U.S. performers and the Japanese, and also indicate considerable differences in their policies and attitudes concerning quality. If the best U.S. companies hope to achieve quality levels comparable to those of

their Japanese competitors, they may have to rethink their present approaches, for incremental improvements are unlikely to close the gap.

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APPENDIX A

All questionnaires included the following ten items. (1) I would rate the quality of my firm's products in relation to its competitors: 1 = much worse to 7 = much better. (2) I am feeling pressure to increase the quality of my firm's products: 1 = very little pressure to 7 = a lot of pressure. (3) I feel that we are at the following stage in understanding our quality problems: 1 = we have very little idea why they occur to 7 = we pretty much know why they occur. (4) If I were to break the "causes" of our quality problems down into areas and then try to assign a percentage to them, I would rate them as follows (please be sure the total adds to 100%): (a) workmanship/workforce problems, (b) materials/parts we purchase, (c) maintenance/adjustment of process or equipment, (d) poor design of process or equipment, (e) poor product design, (f) inadequate systems or controls, (g) management errors (including providing insufficient instructions to the workforce), (h) other (please specify). (5) The management of my company acts as though it considers the manufacturing objectives listed below to have the following weight (1 = relatively unimportant to 7 = extremely important): (a) low-cost production, (b) meeting the production schedule, (c) producing high-quality (defect-free) products, (d) improving worker productivity. (6) If the management of my company were asked to rank its manufacturing objectives in order, I feel that they would respond as follows: (a) low-cost production, (b) meeting the production schedule, (c) producing high-quality (defect-free) products, (d) improving worker productivity. (7) I feel that the production workers in my company: 1 = care very little about product quality to 7 = care a great deal about product quality. (8) When my on-the-job performance is evaluated, I am held responsible for my people's performance in the areas of: (a) amount of rework required, (b) scrap costs, (c) rejection (defect) rates, (d) other quality measures (please specify). (9) I have/have not seen the formal quality statement of my firm. (10) I think my company pays: 1 = too little attention to product quality to 7 = too much attention to product quality.

Item 4 required respondents to assign percentages, while item 6 required them to assign ranks. Items 8 and 9 required yes or no responses. All other items required respondents to use 7-point scales.

APPENDIX B

To identify patterns of behavior, U.S. plants were first grouped into categories according to their quality performance on two dimensions: external quality, measured by failure rates in the field, and internal quality, measured by defect rates in the factory. External quality was measured (1) by the rate of service calls for units under first-year warranty coverage and (2) by this rate after customer instruction calls were subtracted. For the first measure, the total number of service calls recorded in 1981 was divided by the number of units in the field with active first-year warranties; for the second measure, only those service calls that resulted from faulty units, not from customers' improper use or installation, were counted. Plants were grouped into categories on the basis of their rates of service calls less calls for customer instruction. Borderline cases were decided by referring to the total rate of service calls. These measures resulted in three rankings for external quality: good (plants 1, 2, 3), fair (plants 4, 5, 6, 7, 8), and poor (plants 9, 10, 11). The data that formed the basis for these rankings are available from the author.

A similar procedure was followed in classifying plants on internal quality. Companies differed in how they defined and recorded defects; some noted every single product flaw, and others were interested only in major malfunctions. Thus, plants were ranked on several indices: (1) assembly-line defect rates—every defect recorded at every station along the assembly line divided by the total number of units produced; (2) the number of defects requiring off-line repair, which more accurately reflects the incidence of serious problems; and (3) the number of repairmen per direct laborer on an assembly line, which should also correlate well with the incidence of serious defects. Plants were assigned to categories based on their average rankings on these measures, with some adjustment for borderline cases. The three resulting categories of internal quality performance were good (plants 2, 3, 7, 8), fair (plants 1, 4, 5, 6), and poor (plants 9, 10, 11). The individual plants' defect rates, off-line repair rates, and ratios of repairmen to direct laborers that formed the basis for these rankings are available from the author.

Combining internal and external quality rankings produced overall quality rankings for each plant; for U.S. plants, four categories—best, better, fair, and poor—emerged. Table B.1 summarizes this process. The resulting rankings were: best U.S. plants (2, 3), better U.S. plants (1, 7, 8), fair U.S. plants (4, 5, 6), and poor U.S. plants (9, 10, 11). In most cases, success on internal quality implied success on external measures, although the correlation was not perfect, as plants 1, 7, and 8 demonstrate. The Japanese plants were in a category of their own, for on both internal and external measures they were all at least twice as good as the best U.S. plant. Their median rate of service calls for units under first-year warranty coverage was 0.6 percent, with a range of 0.04 to 2.0 percent, and their median rate of assembly-line defects per 100 units was 0.95, with a range of 0.15 to 3.0.

TABLE B.1
Classification of Plants on Internal and External Quality

Internal Quality	External Quality			
	Poor	Fair	Good	Excellent
Poor	9, 10, 11			
Fair		4, 5, 6	1	
Good		7, 8	2, 3	
Excellent				All Japanese plants

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MANAGEMENT TURNOVER THROUGH DEATHS OF KEY EXECUTIVES: EFFECTS ON INVESTOR WEALTH

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As an initial step in redirecting research on turnover to focus on its consequences, this study examined the reaction of the securities' market to the deaths of certain key executives. Although death had little influence on the market for the population studied as a whole, when key executives were differentiated by position, significant differences did occur. Negative abnormal returns were also found to be associated with name recognition and suddenness of executives' deaths.

Turnover has been one of the most examined topics in the literature on organizations. As Bluedorn (1982) reported, over 1,500 studies of turnover have appeared in this century. The major focus of this literature has been on the determinants of turnover. Empirical research has primarily focused on its demographic, psychological, and economic antecedents, and theoreticians have developed models of turnover behavior based on these findings (e.g., Bluedorn, 1982; Mobley, Griffeth, Hand, & Meglino, 1979; Muchinsky & Tuttle, 1979; Porter & Steers, 1973; Price, 1977).

Staw (1980) argued that, given the voluminous empirical data and the detailed theoretical models already available, the yield of additional studies on the determinants of turnover will likely be rather low. Others have made a case for redirecting research on turnover, suggesting that scholars examine the consequences of individuals' leaving organizations rather than antecedents alone (Dalton & Todor, 1979; Staw, 1980; Staw & Oldham, 1978).

Recently, there also has been a call for closer working relationships between researchers in management and financial researchers on problems that lie at the interface of the two disciplines (Bettis, 1983; Peavy, 1984). This study, a first effort in that direction, tested the reaction of the securities' market to the deaths of certain key executives.

We would like to thank the three anonymous reviewers for their helpful comments and suggestions.

FINDINGS ON TURNOVER AND SUCCESSION

Most prior research on the consequences of turnover focuses on managerial succession. Although there is much overlap, studies of succession tend to center more on the effects of replacement than on the effects of employee separations, or turnover. The results of such studies have been mixed. Christensen (1953) found that changes in top management threatened profits in small manufacturing firms. Gouldner (1954), in a case study of managerial succession in a gypsum plant, observed that a change of managers disrupted the operations of the plant. However, in a case study of an automobile assembly line, Guest (1962) reported that a change in managers resulted in improved plant performance.

Grusky (1963) conducted the first of a series of empirical examinations (Allen, Panian, & Lotz, 1979; Brown, 1982; Eitzen & Yetman, 1972; Gamson & Scotch, 1964; Grusky, 1964; Pfeffer & Davis-Blake, 1986) focusing on managerial succession and organizational performance in sport teams. Pfeffer and Davis-Blake, for example, recently reported in a study of 22 National Basketball Association teams for the 1977 through 1981 seasons that succession had no effect on subsequent team performance when prior performance was controlled. However, when coaching competence was included in the analysis, succession was found to affect subsequent performance. Sport teams have been chosen in these studies largely because they have clear measures of both succession and performance. Although these studies have yielded insights, the applicability of their results to other types of complex organizations is uncertain (Neale, 1964).

Lieberson and O'Connor (1972) found support for scapegoating (Gamson & Scotch, 1964) in their study of changes in top management in 167 large corporations over 20 years. They reported that little variance in sales, earnings, and profit margins could be attributed to changes in chief executives. Salancik and Pfeffer (1977), in a study of the influence of mayors in 30 U.S. cities on city budgets over the period 1951–68, reached a similar conclusion; of three possible factors, year, city, or mayor, the city was consistently the most important factor accounting for variance in budget expenditures and income. Staw (1980) asserted that the apparent moderator of the effects of turnover in both these studies was the extent of the external constraints facing key executives. Weiner and Mahoney (1981), in a reanalysis of Lieberson and O'Connor's data, as well as in an examination of 193 manufacturing companies over a 19-year period, found that top leadership did account for more variance in organizational performance than did many organizational or environmental factors. They attributed differences between their findings and Lieberson and O'Connor's largely to the levels of specificity of criterion measures and the statistical procedures used. Smith, Carson, and Alexander (1984), in a study of the effects of 50 ministers on organizational performance between 1961 and 1980, reported that changes in leadership did not disrupt organizational performance or lead to immediate improvements in the group as a whole. However, when effective leaders were

differentiated, churches led by these superior performers repeatedly experienced greater giving, membership growth, and property development than did other churches.

Although there has been relatively little research on the consequences of turnover,¹ it appears evident that its effects on organizational functioning are extremely complex. Moderating variables condition outcomes, and there are benefits as well as costs of turnover in organizations (Dalton, Krackhardt, & Porter, 1981; Dalton & Todor, 1979; Mobley, 1982; Staw, 1980; Staw & Oldham, 1978). Because of this complexity, this study was necessarily a preliminary one.

RESEARCH ISSUES

To date, there has been no empirical examinations of the specific variables the current analysis uses to measure the impact of executive death on investors' wealth,² so formulation of hypotheses must be largely speculative. However, as Price observed, "The conventional wisdom is probably correct in its belief that turnover generally has a basically negative impact on effectiveness" (1977: 119). Pfeffer notes, "If leadership has any impact, it should be more evident at higher organizational levels or where there is more discretion in decisions and activities" (1977: 108). Further, Staw (1980: 267) proposed that the higher the level of the positions to be filled, the greater the potential for disruption, and the greater the costs of recruitment, selection, and training, particularly if outside succession occurs. Thus, it seems reasonable to hypothesize that the deaths of key executives will be negatively associated with investors' wealth.

Financial theory suggests that a firm's value is affected positively when its expected cashflows increase or its systematic risk decreases (Fama & Miller, 1972). If involuntary turnover occurs through the death of a key executive, the price of shares will go down if expected cashflows are reduced or if systematic risk increases. This study tested the reaction of the securities' market to turnover among key executives through the deaths of CEOs and corporate chairmen.

As discussed in the introductory section, this study differs from most of the existing empirical literature on turnover in focusing on consequences

¹ In a recent study on the effects of executive succession on stock returns, Reinganum (1985) reported positive returns around the time of the announcement of a change for external appointments in small firms that announced the departure of the former office holder concurrently with the successor's appointment. Reinganum's study dealt with succession in general; this study examined returns from turnover caused by key executives' deaths.

² However, in a recently published exception from the accounting literature, Johnson, Magee, Nagarajan, and Newman (1985), using similar methodology and a shorter sampling period, examined the reaction of stock returns to only sudden deaths of key executives. Sudden deaths were reported to have little systematic effect on stock returns, but founder status was found to be associated with positive returns. This contrasts with the current study, which reports both sudden deaths of CEOs and founder status to be associated with negative returns. Both studies obtained negative abnormal returns for top leadership positions, with Johnson and colleagues defining position by compensation and the current study defining position by title.

rather than determinants. A second important difference is that it centers on involuntary turnover, and most of the existing empirical literature concentrates on voluntary turnover. Price (1977) stated three reasons for this concentration: most turnover is voluntary, the formation of theory is easier when the phenomenon to be explained is homogeneous, and voluntary turnover is more subject to control by managers.

It is important to study involuntary turnover in order to improve understanding of the overall process of turnover. Voluntary and involuntary turnover probably have quite different antecedents and consequences; separating the two phenomena should make it easier to develop viable theory. However, we suggest that further refining this traditional dichotomy might yield an even more realistic portrayal of the effects of turnover on organizations (Dalton, Krackhardt, & Porter, 1981).

Incidents of involuntary turnover, such as layoffs, dismissals, and retirements, tend to be initiated by organizations rather than by individuals. For key executives, however, involuntary, organization-initiated turnover is often difficult to distinguish from voluntary turnover. As James and Soref noted, "chief executives and companies usually prefer to treat the matter delicately; hence, generally, 'resignations' are accepted, or 'early retirements' are taken, but firings do not occur" (1981:4). When turnover and succession are anticipated, as in the case of retirement, the stock market may not respond because the event has been expected. Examining deaths of key executives largely avoids such methodological problems because death is typically involuntary and not initiated by a company, and in many cases it is completely unanticipated.

The present study differs from most previous empirical literature on turnover in two additional ways. First, it focuses on turnover among key executives. Although a small sociological literature on executive succession exists, most research on turnover has focused on lower-level employees in organizations (Staw, 1980). This study concentrates on key executives at the very top levels of organizations (CEOs and chairmen) rather than on general managerial succession and turnover.

Second, this study employs a methodology new to the study of turnover in organizations. We describe the specific features of event methodology in the next section and present them more fully in the Appendix. This methodology seemed especially appropriate because death is a relatively unanticipated and clear-cut event. The procedure provides a dramatic test of the effects of involuntary turnover on firms' stock market values.

METHODS

Data Analysis

The purpose of this study was to determine the securities' market's reaction to the deaths of certain key executives by measuring abnormal returns. We used the standard event methodology first developed by Fama, Fisher, Jensen, and Roll (1969). Others have used this procedure, with minor

variations, to test events such as the release of earnings information (Ball & Brown, 1968), secondary stock sales (Scholes, 1972), changes in accounting procedures (Cassidy, 1976; Kaplan & Roll, 1972), dividend changes (Charest, 1978), public utility rate cases (Davidson, 1984), and corporate divestiture (Montgomery, Thomas, & Kamath, 1984). Because the complete explanation of the procedure appears in the Appendix, we only briefly summarize it here.

Regressing the returns on each security against the return on a market index provided a predictive model. We used this market model to predict the normal returns for a period of 90 days prior to an event—an announcement of the death of a key executive—and 30 days afterward. The actual returns on the stock were compared to the predicted returns, and the difference called an abnormal return. We then summed and averaged the abnormal returns across companies for each day relative to an event and cumulated them over various intervals relative to the date of the event. These computations provided the average abnormal returns and cumulative abnormal returns. If investors have received information that causes stock prices to rise relative to the market, the average abnormal returns and cumulative abnormal returns will be positive. If the information causes stock prices to decline relative to the market, then these same statistics will be negative. We conducted *t*-tests on these statistics to determine significance; the Appendix fully explains these tests.

Such predictive models have been criticized (Scholes & Williams, 1977). Although research suggests that many of these criticisms are unfounded (Brenner, 1979; Brown & Warner, 1980, 1983; Davidson, 1984), we also used a second model, the average return model, which is similar except that the regression parameters for the intercept and slope are replaced with 0 and 1. All other computations are the same.

Study Population

We defined key executives as corporate presidents or chief executive officers, both referred to as CEOs hereafter, or as chairmen of boards of directors. We further restricted the population studied to only those officers who were CEOs, chairmen, or both, of parent corporations; officers of subsidiaries were excluded. An officer's death had to have been announced in the *Wall Street Journal* during the 15-year period from 1967 to 1981.

After finding an initial 220 deaths, we excluded officers of any firms that were not traded on the New York or American Stock Exchange. This restriction biased the group to large companies, but served two purposes. It permitted the use of the CRSP tapes from the University of Chicago's Center for Research in Security Prices, which contain data on returns for all stocks listed on these exchanges. It also ensured that the securities were traded frequently enough to permit good estimates of the market model's parameters. Finally, we further restricted the study population by excluding firms in which the death of a second key executive occurred during the parameter

estimation period following the death of one key executive. The final population included 127 key executives; 61 had the title of Chairman of the Board, 23 were CEOs, and 43 both CEOs and chairmen. We present results for the total population and for each of the three subgroups separately.

RESULTS

Total Population

Table 1 and Figure 1 present results for the population as a whole. Table 1 shows the abnormal returns and cumulative abnormal returns for various subintervals. The *t*-tests on the abnormal returns are all insignificant at conventional levels of significance; the market did not react significantly to the news of the death of a key executive on a single day. For days on which deaths were reported in the *Wall Street Journal*, represented by 0 in the first column, the abnormal return is positive, but insignificant. Results from both the market model and the average return model are qualitatively the same. Second, it is important to note that the cumulative abnormal return for the interval 0 to 30 is .0156, indicating that the reaction of the market in the 30 days following reports of deaths was positive.³ Figure 1 depicts this upward movement. Prior to day 0, the cumulative abnormal returns hover below 0, but become positive during the 30 days after the reports.

For days -10 to 0, -7 to 0, and -7 to -3, the cumulative abnormal returns are insignificant. We tested the subinterval between days -7 and -3 because, in most instances, firms reported key executives' deaths from three to seven days after the actual date of death. By testing this specific subinterval, we tested the market's reaction to the actual dates of deaths as well as to the public announcements. We did not use the actual dates of deaths as the event dates because they were not as consistently available as the dates of announcements, and the population's size would have been further restricted. Therefore, by accumulating the abnormal returns over these pre-event subintervals, we could test for the market's reaction between dates of death and dates that the news reached the market. As the table shows, the cumulative abnormal returns for the total population over these subintervals are insignificantly different from 0.

Subgroups

The roles of CEOs and chairmen may be quite different. In the past, except in times of crisis, boards of directors customarily had little true authority and rubber-stamped management's decisions (Mace, 1971). Although the

³ Initially, we computed cumulative abnormal returns for up to +90 days. To minimize the overlap between the turnover and subsequent succession events, this study reports CARs only to +30 days. For the total group studied, the positive reaction continued beyond 30 days (day 60, .0171; day 90, .0335). However, the reactions during these periods may result from the successions. Further study on succession following a key executive's death is necessary to isolate reactions. For CEOs' deaths, the cumulative abnormal return stabilizes after day 6 and remains negative even through +90 days.

TABLE 1
Cumulative Abnormal Returns for Deaths in Total Population
and Deaths of CEOs

	Intervals ^a T ₁ to T ₂	Market Model ^b		Average Return Model ^b	
		CARs	Test	CARs	Test
			Statistics		Statistics
(a) Total Population (N=127)					
	-90 to 0	-.0061	-0.09	.0103	0.32
	-10 to 0	.0008	0.11	.0026	0.37
	- 7 to 0	-.0025	0.41	-.0018	-0.30
	- 7 to -3	-.0040	-0.81	-.0025	-0.51
	-7	-.0003	-0.10	.0004	0.13
	-6	-.0004	-0.13	.0002	0.07
	-5	.0003	0.10	.0003	0.09
	-4	-.0024	-0.79	-.0023	-0.75
	-3	-.0015	-0.49	-.0008	-0.26
	-2	-.0002	-0.06	-.0004	-0.13
	-1	.0004	0.13	-.0001	-0.03
	0	.0013	0.43	.0013	0.43
	1	-.0005	-0.16	-.0008	-0.26
	2	.0042	1.38	.0046	1.51
	0 to 30	.0156	0.71	.0198	0.91
(b) CEOs (N=23)					
	-90 to 0	-.0930	-1.42	-.0623	-0.93
	-10 to 0	-.0182	-1.09	-.0147	-0.90
	- 7 to 0	-.0196	-1.38	-.0214	-1.50
	- 7 to -3	-.0162	-3.29***	-.0138	-2.80***
	-7	.0047	1.41	.0049	1.45
	-6	-.0029	-0.87	-.0027	-0.80
	-5	-.0008	-0.24	-.0010	-0.30
	-4	-.0065	-1.95*	-.0056	-1.66
	-3	-.0060	-1.79*	-.0044	-1.30
	-2	-.0021	-0.63	-.0021	-0.62
	-1	-.0050	-1.50	-.0052	-1.54
	0	-.0009	-0.27	-.0003	-0.09
	1	.0002	0.66	.0015	0.44
	2	.0065	1.95*	.0063	1.86*
	0 to 30	-.0006	-0.03	.0093	0.43

^aAnnouncement days (day 0) generally follow the actual dates of deaths by 3 to 7 days. Hence, these days are highlighted along with day 0.

^bCARs = cumulative abnormal returns. The test statistics are described in the Appendix. When an interval of more than one day is used, the test statistic is of the form reported in Brenner (1979). When the interval includes only one day, the test statistic is the time series *t*-test as reported in Davidson (1984).

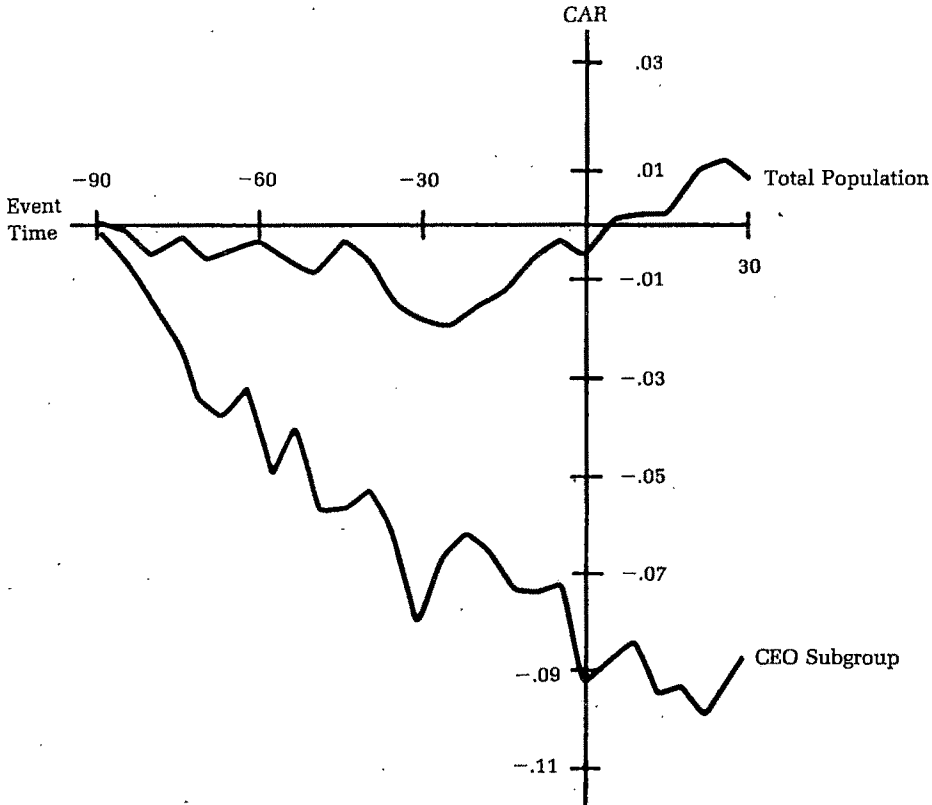
* $p < .10$

** $p < .05$

*** $p < .01$

FIGURE 1

**Cumulative Abnormal Returns Surrounding the Deaths of Key Executives
for Total Population and CEO Subgroup**



recent increase in outsiders on many boards, coupled with increased legal challenges by stockholders and various social reform movements, have led to more active roles for board members (Boulton, 1978), the actual strategic operation of most organizations remains primarily in the hands of CEOs. Because of these potential differences, we subdivided key executives into three groups: (1) CEO only, (2) chairman only, and (3) both CEO and chairman.

The bottom half of Table 1 presents the reaction of the market to the deaths of 23 CEOs. In contrast to results based on the total population, the deaths of CEOs appear to be associated with a negative reaction by the securities' market. From days -7 to -3, the cumulative abnormal return is negative and statistically different from 0 ($p < .01$). On days -4 and -3, the abnormal returns are significantly negative, and all of the abnormal returns from days -6 to -1 are negative. These negative abnormal returns may be results of the news of the CEOs' deaths reaching the market on the dates of

deaths or on subsequent days, before announcements appeared in the *Wall Street Journal*. The frequent three-to-seven-day time lag in reporting deaths is the period over which there are statistically significant abnormal returns. From day -6 to day 0, there is a large drop in the cumulative abnormal return, which generally remains at this lower level for the next 30 days (Figure 1).

The market's reaction to the deaths of the 61 corporate chairmen in our population appears in the top half of Table 2. No evidence of significantly negative abnormal returns appears on, or around, day 0. On the contrary, a significantly positive abnormal return on day 0 suggests that the market reacted favorably to the news of the deaths of corporate chairmen. As with any statistical tests, it is possible that chance accounts for these results. However, both return-generating models confirm these results, and the significant reactions are notably right on the announcement date. In Figure 2, the upward drift in the cumulative abnormal return is evident. Results for the subintervals from -10 to 0 and 0 to 30 are insignificant, but positive (Table 2). This evidence also supports the idea that the market reacted positively to the deaths of the chairmen.

The bottom half of Table 2 presents the abnormal returns for the deaths of executives who served both as CEO and chairman. For this group, significantly negative abnormal returns on days -7 and 0 indicate that the death of a CEO/chairman is associated with negative market returns on and before the date of announcement. Figure 2 shows an apparent upward movement in the cumulative abnormal return over the period -30 to +30, but on the days immediately around day 0, the movement is downward.

Other Results

In an attempt to determine whether other circumstances determine how the market reacts to the deaths of key executives, we created two additional subgroups and recomputed results. The first subgroup included CEOs who died suddenly, and the second was executives whose names might be easily recognizable.

Any CEO, regardless of other titles, who died of a heart attack, an accident, or violence was included in the first regrouping. Results for this subgroup, which included 41 firms, appear in the top half of Table 3. Over the intervals between days -7 and 0, and -7 and -3, there are statistically significant ($p < .05$), negative cumulative abnormal returns of .0269 and .0134. In addition, the abnormal returns on day -7 and 0 are statistically significant ($p < .10$ and $p < .01$, respectively) and are negative. The sudden-death subgroup is associated with very strong negative abnormal returns—it appears that the market reacted very strongly to the deaths of these executives.

The second regrouping, based on name recognition, includes only those key executives whose names are incorporated in their companies' names, because it is very difficult to determine whether a name was easily recognized, particularly when considerable time has passed since a death. Generally, these executives were founders, or relatives of the founders, of the companies.

TABLE 2
Cumulative Abnormal Returns for Deaths of Chairmen and CEO/Chairmen

			Market Model ^b		Average Return Model ^b	
	Intervals ^a		Test		Test	
	T ₁ to T ₂		CARs	Statistics	CARs	Statistics
(a) Chairmen (N=61)						
	-90 to	0	.0043	0.05	.0225	0.24
	-10 to	0	.0136	1.33	.0151	1.50
	- 7 to	0	.0065	0.74	.0056	0.64
	- 7 to	-3	-.0018	-0.37	-.0013	-0.26
	-7		.0020	0.61	.0034	1.02
	-6		.0009	0.27	.0016	0.48
	-5		-.0001	-0.03	-.0006	-0.18
	-4		.0001	0.03	-.0002	-0.06
	-3		-.0025	-0.76	-.0020	-0.60
	-2		.0010	0.30	.0016	0.48
	-1		-.0005	-0.15	-.0009	-0.27
	0		.0078	2.36**	.0077	2.31**
	1		-.0020	-0.61	-.0023	-0.69
	2		.0034	1.03	.0041	1.22
	0 to	30	.0219	0.71	.0242	0.81
(b) CEO/Chairmen (N=43)						
	-90 to	0	.0269	0.27	.0327	0.30
	-10 to	0	-.0049	-0.40	-.0051	-0.43
	- 7 to	0	-.0031	-0.30	-.0034	-0.32
	- 7 to	-3	-.0004	-0.08	.0018	0.37
	-7		-.0062	-2.17**	-.0063	-2.18**
	-6		-.0006	-0.21	-.0001	-0.03
	-5		.0014	0.49	.0024	0.83
	-4		-.0034	-1.19	-.0033	-1.14
	-3		.0022	0.77	.0028	0.97
	-2		-.0007	-0.24	-.0023	-0.79
	-1		.0045	0.16	.0037	1.18
	0		-.0065	-2.27**	-.0066	-2.88***
	1		.0002	0.07	.0001	0.03
	2		.0039	1.36	.0043	1.38
	0 to	30	.0114	0.39	.0152	0.41

^aAnnouncement days (day 0) generally follow the actual dates of deaths by 3 to 7 days. Hence, these days are highlighted along with day 0.

^bCARs = cumulative abnormal returns. The test statistics are described in the Appendix. When an interval of more than one day is used, the test statistic is of the form reported in Brenner (1979). When the interval includes only one day, the test statistic is the time series t-test as reported in Davidson (1984).

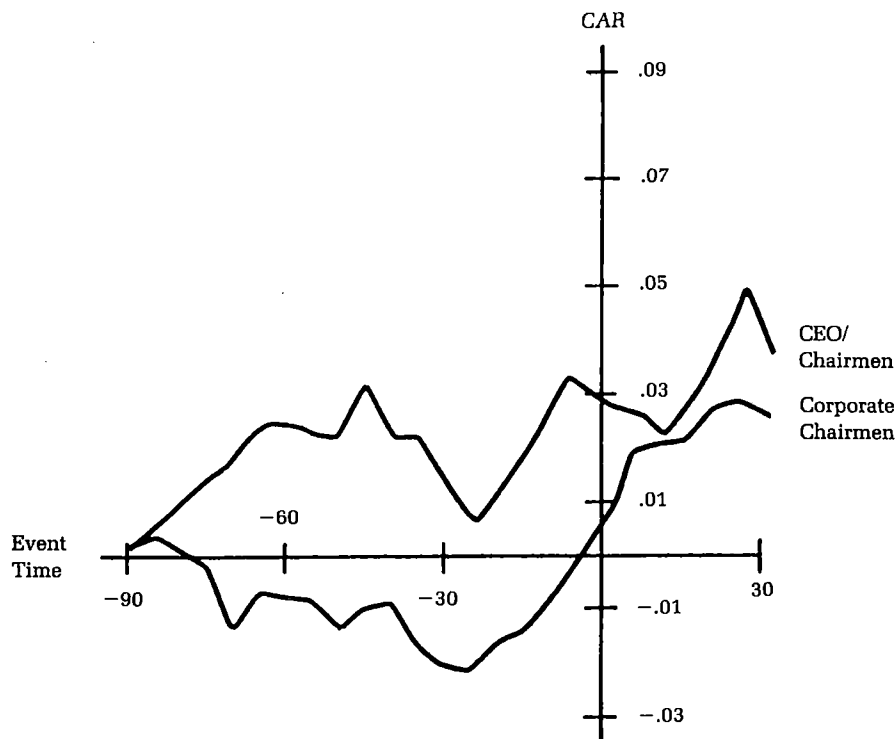
* $p < .10$

** $p < .05$

*** $p < .01$

FIGURE 2

Cumulative Abnormal Returns Surrounding the Deaths of Corporate Chairmen



The bottom half of Table 3 shows results for this subgroup of 18. The abnormal return on day -6 is statistically significant and negative, but although it is negative for the interval between days -7 and -3, it is insignificant. The deaths of these executives seem to be associated with negative returns, but the results are not as strong as some of the findings reported earlier in this section.

DISCUSSION

Our hypothesis was that key executives' deaths would be negatively associated with investors' wealth. An examination of the results for the total group studied, however, reveals that such deaths do not significantly affect the market. This finding supports the position that studies of sports teams have put forth—namely, that succession has a null effect (Brown, 1982; Eitzen & Yetman, 1972; Gamson & Scotch, 1964)—and it is consistent with the findings of Lieberman and O'Connor (1972), Salancik and Pfeffer (1977), and Smith, Carson, and Alexander (1984).

TABLE 3
Cumulative Abnormal Returns for Other Subgroups

Intervals ^a		Market Model ^b		Average Return Model ^b	
		CARs	Test Statistics	CARs	Test Statistics
(a) CEOs--Sudden Death Subgroup (N=41)					
-90 to 0	0	-.0358	0.36	-.0356	-0.34
-10 to 0	0	-.0222	-1.72	-.0227	-1.73
-7 to 0	0	-.0269	-2.45**	-.0308	-2.50**
-7 to -3	-3	-.0134	-2.68**	-.0142	-2.73**
-7	-7	-.0060	-1.75*	-.0059	-1.69
-6	-6	-.0035	-1.02	-.0034	-0.99
-5	-5	.0023	0.67	.0022	0.64
-4	-4	-.0021	-0.61	-.0021	-0.61
-3	-3	-.0041	-1.19	-.0050	-1.23
-2	-2	-.0035	-1.02	-.0043	-1.29
-1	-1	-.0003	-0.09	-.0004	-0.09
0	0	-.0097	-2.84***	-.0119	-3.06***
1	1	.0005	0.15	.0004	0.14
2	2	.0054	1.58	.0055	1.49
0 to 30	30	.0035	0.12	.0036	0.15
(b) Name Recognition Subgroup (N=18)					
-90 to 0	0	.0062	0.09	.0829	1.20
-10 to 0	0	-.0121	-0.73	-.0100	-0.60
-7 to 0	0	-.0042	-0.30	-.0032	-0.23
-7 to -3	-3	-.0060	-1.22	-.0042	-0.85
-7	-7	-.0049	-1.03	-.0041	-0.85
-6	-6	-.0132	-2.78**	-.0129	-2.69**
-5	-5	.0062	1.31	.0061	1.27
-4	-4	.0010	0.21	.0003	0.06
-3	-3	.0000	0.00	.0022	0.46
-2	-2	-.0041	-0.86	-.0036	-0.75
-1	-1	-.0004	-0.08	.0005	0.10
0	0	.0062	1.30	.0041	0.85
1	1	.0046	0.97	.0022	0.46
2	2	.0006	0.13	.0027	0.56
0 to 30	30	-.0015	-0.08	-.0113	0.60

^aAnnouncement days (day 0) generally follow the actual dates of deaths by 3 to 7 days. Hence, these days are highlighted along with day 0.

^bCARs = cumulative abnormal returns. The test statistics are described in the Appendix. When an interval of more than one day is used, the test statistic is of the form reported in Brenner (1979). When the interval includes only one day, the test statistic is the time series t-test as reported in Davidson (1984).

* $p < .10$

** $p < .05$

*** $p < .01$

There are a number of possible reasons why the market did not significantly react to the deaths of key executives in the full population. One possibility is that some firms experienced significant positive abnormal returns during trading days around the event date, but other firms experienced significant negative abnormal returns. Offsetting positive and negative abnormal returns may have averaged out to an overall zero effect.

A second possibility is that the variation in the number of trading days between dates of the publication of the obituary notices by the *Wall Street Journal* and the actual dates of deaths may have inhibited accurate measurement. The daily average abnormal returns may not provide an adequately precise representation of the effects of key executives' deaths on abnormal returns.

The results may also be sample-specific. The effects of key executives' deaths on investors' returns may well vary with organizational size, and this population was restricted to firms large enough to be listed on the major exchanges. In smaller organizations, management may rest in the hands of a few dominating figures. In addition, no highly refined management training program to provide back-up management support may be in place.

A final potential explanation is that the market may have anticipated the deaths before they happened. This scenario seems particularly likely where the deaths were not sudden. If the market has an indication of a key executive's impending departure (for example, a terminal illness), the prices of securities may embody evaluative implications of the event prior to its occurrence.

Table 4 summarizes the results for the various subgroups. The results indicate that if key executives are viewed as a homogeneous group, their deaths appear to have little influence on the market. However, although we found no systematic reaction in stock prices for the full group, we observed important adjustments in stock prices for subgroups. Many of these significant adjustments appear in the columns for the intervals between days -7 and -3, -7 and 0, and for day 0. The results indicate that if key executives are differentiated by position into chairman-only, CEO-only, and CEO-and-chairman subgroups, their deaths seem to make a difference. In addition, negative abnormal returns are also associated with suddenness of death and executive name recognition.

For the chairman-only subgroup, the results suggest that the market reacted positively to the deaths. Any possible explanations for this occurrence must be largely speculative, but it is interesting to note that the chairmen in our population were often in their 70s, 80s, and even 90s. The positive reaction may imply that the market viewed such turnover as a positive sign and a chance for innovation and adaptation (Staw, 1980). It should be stressed that in order for a price reaction to take place, expected cash flows would have to change.

Another similar explanation comes under the general heading of "settling up" (Fama, 1980: 304-306), a notion we can illustrate with an example. Suppose an executive is doing an adequate job, but is overpaid relative to

TABLE 4
A Comparison of Cumulative Abnormal Returns and Test Statistics^a
for the Various Groupings, Market Model

Groupings	Intervals ^a									
	-7 to 0	-7 to -3	-7	-6	-5	-4	-3	-2	-1	0
Total population (N = 127)	-.0025 (0.41)	-.0040 (-0.81)	-.0003 (-0.10)	-.0004 (-0.13)	.0003 (0.10)	-.0024 (-0.79)	-.0015 (-0.49)	-.0002 (-0.06)	.0004 (0.13)	.0013 (0.43)
CEOs (N = 23)	-.0196 (-1.38)	-.0162 (-3.29)***	.0047 (1.41)	-.0029 (-0.87)	-.0008 (-0.24)	-.0065 (-1.95)*	-.0060 (-1.79)*	-.0021 (-0.63)	-.0050 (-1.50)	-.0009 (-0.27)
Chairmen (N = 61)	.0065 (0.74)	-.0018 (-0.37)	.0020 (0.61)	.0009 (0.27)	-.0001 (-0.03)	.0001 (0.03)	-.0025 (-0.76)	.0010 (0.30)	-.0005 (-0.15)	.0078 (2.36)**
CEOs and chairmen (N = 43)	-.0031 (-0.30)	-.0004 (-0.08)	-.0062 (-2.17)**	-.0006 (-0.21)	.0014 (0.49)	-.0034 (-1.19)	.0022 (0.77)	-.0007 (-0.24)	.0045 (0.16)	-.0065 (-2.27)**
CEOs, sudden death (N = 41)	-.0269 (-2.45)**	-.0134 (-2.68)**	-.0060 (-1.75)*	-.0035 (-1.02)	.0023 (0.67)	-.0021 (-0.61)	-.0041 (-1.19)	-.0035 (-1.02)	-.0003 (-0.09)	-.0097 (-2.84)***
Name recognition (N = 18)	-.0042 (-0.30)	-.0060 (-1.22)	-.0049 (-1.03)	-.0132 (-2.78)**	.0062 (1.31)	.0010 (0.21)	.0000 (0.00)	-.0041 (-0.86)	-.0004 (-0.08)	.0062 (1.30)

^aThe test statistics are described in the Appendix. When an interval of more than one day is used, the test statistic is of the form reported in Brenner (1979). When the interval includes only one day, the test statistic is the time series t-test reported in Davidson (1984).

^bAnnouncement days (day 0) generally follow the actual dates of deaths by 3 to 7 days. Hence, these days are highlighted along with day 0.

* $p < .10$

** $p < .05$

*** $p < .01$

ability. When this executive dies, the market settles up by treating this news as positive. These results may represent such an effort; the marginal benefits many chairmen bring may be perceived to be less than their marginal compensation.

The market's reaction to the deaths of CEOs appears to be negative, at least in the short run. In addition, the market reacted on or around the actual dates of deaths and not necessarily at the time of announcements in the financial press. It seems that the market reacts more negatively toward the deaths of hands-on key executives than it does toward the deaths of chairmen.

An individual who is both CEO and chairman is likely to have much power within an organization, and the death of such an individual is likely to create uncertainty, since two key positions become vacant. The results show statistically significant, negative returns on the dates that the deaths of such individuals were reported, indicating that the market reacted negatively. In terms of settling up theory, if the market views CEOs' deaths as negative, it perceived their productivity as outweighing their compensation. The market settles up to the loss of their productivity by reacting negatively.

It is important to note that the market often reacted strongly prior to the dates deaths were announced. These pre-event reactions are not uncommon in other studies applying event methodology; in fact, it was evident in the study in which the methodology was pioneered (Fama, Fisher, Jensen, & Roll, 1969). There are at least two explanations. The first implies super efficiency on the part of securities' analysts, who keep in touch with companies regularly. Although a death may not be public information for a few days, they may obtain the information sooner and adjust even before the announcement.

A second, related explanation centers around the event date used in this research, the date of announcement in the *Wall Street Journal*. Local news media may report the deaths of executives from their vicinities days before the national press picks up on these stories.

In an effort to sort out differences in the full population that were not due to differences in executives' positions, we examined two additional groups: CEOs who died suddenly and executives with name recognition. The results indicate that reactions to sudden deaths tend to be negative. We found very negative abnormal returns between the dates of deaths and the dates the deaths were reported, and the reaction on the dates of announcements in the *Wall Street Journal* (day 0) was particularly large and negative. For this subgroup, the market was unable to anticipate CEOs' deaths, and the reaction upon receipt of the news was particularly negative. Unexpected deaths minimize the probability that the securities' market can anticipate the event.

Likewise, although the results for the name-recognition subgroup were not as strong as for the sudden-death subgroup, they also indicate a possible negative impact on the market. A key executive who is highly publicized or who has the status of a founder may be seen as the personality of a company, and the death of such an individual could have an especially negative effect

on the market. For example, in 1966, when the market learned Walt Disney was facing a lingering death from cancer, a substantial drop in Disney stock prices occurred. Stockholders in that firm have since spent many years mourning the loss of the founder's magic touch. Indeed, a recent article (*Wall Street Journal*, 1982) observed, "There is not as yet any firm evidence that the company's motion picture division has climbed out of the black hole it stumbled into after Mr. Disney's death" (1982: 1).

Although some significant differences in the effects of the deaths of key executives emerged when we took executive position, predictability of death, and name recognition into account, several caveats should be kept in mind. First, the nature of the population and the many nonsignificant findings restrict the generalizability of results. Although this study was a step toward redirecting research to focus on the consequences of turnover, it was itself very narrowly focused on the short-run effects of the deaths of key executives from large companies on investor wealth. Second, although we used two predictive models (McDonald & Nichols, 1984), the results may have been dependent on the model for generating normal returns. Additionally, the influence of outside factors and chance cannot be ignored. Leaders, even key executives, seldom have unilateral control over resources and policies.

These limitations, and others discussed previously in this paper, suggest directions for future research. Strongly indicated are additional investigations into how the positions of CEO and chairman differ. Organizational size and the extent to which key executives are aggressively managing organizations prior to death might also be included in future research. Additional control variables, such as age, length of tenure, and percentage of compensation in the form of profit sharing or stock options, may also affect how the market perceives an executive's death. Better ways of determining how the market recognizes an executive's name could also be developed to determine how it would react to deaths of executives perceived very favorably or unfavorably.

Finally, a follow-up is needed that would build on Reinganum's (1985) research exploring the effects of executive succession on stock prices in 1978 and 1979, and that would specifically examine the effects of succession among key executives following a death. Such research would indicate how long the cumulative abnormal returns attributable to deaths are sustained following successions, and what additional effects successions themselves have on investors' wealth. Results could be compared with the financial consequences of the more general phenomena of turnover and succession among key executives.

The lack of prior data on the relationships between the deaths of key executives and investors' wealth and the limitations of the present study permit few strong generalizations. However, we can identify a few implications for both investors and managers. First, for investors, significant results from analyses of subgroups give further credence to the need for diversification of portfolios. In addition, investors faced with a CEO's death, or an executive's sudden death, or the death of an executive who had name

recognition, might consider going short on the stocks of the affected firms. On the other hand, the death of a corporate chairman appears to present an opportunity for investors to go long. However, an investor would have to have insider information about an actual date of death and would have to act before the date of announcement in the *Wall Street Journal*. An investor would also generally have to invest in affected firms one at a time, since it is unlikely that deaths of key executive officers would occur in groups.

Since death is an unplanned event, implications for managers are difficult to develop. However, with the aging of the baby-boom generation and the extension of mandatory retirement, understanding the consequences of executives' deaths is more important than ever. We made no attempt in this study to determine differences in reactions for companies that were prepared for CEO turnover and those that were not, but preparedness may well lessen the potential negative effects on shareholders' returns. Firms should identify potential successors and groom them to assume key leadership positions. Furthermore, some top executives may need to carry life insurance with their companies named as the beneficiaries. Although few companies will release information about such insurance coverage, its presence may lessen effects on investors' returns and provide a firm with the liquidity necessary to overcome a tragedy.

In conclusion, it is evident that the effective management of turnover presupposes a fuller understanding of its consequences. We hope this study encourages further interdisciplinary investigations that reorient turnover research from primarily examining the antecedents of individuals' leaving organizations. The consequences of turnover deserve fuller research attention than they have been accorded.

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APPENDIX

The purpose of this study was to determine the securities' market's reaction to the deaths of certain key executives. We computed and analyzed abnormal returns. The measurement of abnormal returns implies that a model can be specified that generates normal returns; we used the following market model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it}, \quad (1)$$

where R_{it} is the return on security i at time t , α_i is a regression intercept, β_i is the beta coefficient of the regression, R_{mt} is the return on the market index at time t , and e_{it} is the disturbance term.

Day 0 is defined as the day that news of an executive's death appeared in the *Wall Street Journal*. A first-pass regression of each security's returns against the returns on the market (Equation 1) is run over days -291 to -91 to obtain estimates for the parameters of the market model, α_i and β_i .

The market model parameters for each of the i company's securities are applied to the actual market returns for days -90 to +30, which provide the predicted returns for company i . These predicted returns are compared to the actual returns for each of the i companies from -90 to +30. We limited the days after an event to 30 to minimize the effect of succession. In this population, it took an average of 20.8 days to replace a key executive; in addition, it is not unreasonable to expect a further time delay before a replacement gains effective control. The difference between the actual returns and the predicted returns for security i at time t is called the abnormal return, AR_{it} :

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}), \quad (2)$$

where R_{it} represents the actual return on security i at time t , and the term in parentheses is the normal return. The other variables are as previously defined.

The average abnormal return is computed by summing the abnormal returns across all N firms for each relative event time, t , as follows:

$$AR_t = \sum_{i=1}^N \frac{AR_{it}}{N}. \quad (3)$$

The cumulative abnormal return (CAR) is also computed over various intervals, T_1 to T_2 :

$$CAR_{T_1, T_2} = \sum_{t=T_1}^{T_2} AR_t. \quad (4)$$

In an efficient market, the return on a security will react immediately to an event that affects its intrinsic value. Under these conditions, the AR_t and CAR will be random except upon receipt of the news of an event. When information that affects the value of firms reaches the market for each firm at the same time relative to day 0, then the AR_t should not be 0. If the information flow is not uniform with respect to event times, the CAR will not be 0. We used test statistics to determine when an AR_t or CAR was significantly different from 0.

The test statistic for the AR_t is a time series t -test as reported in Davidson (1984), and is similar to the one in Jain (1985). The statistic T_t can be computed in the following manner:

$$T_t = \frac{AR_t}{SD_{ar}}, \quad (5)$$

where SD_{ar} is the standard deviation of the AR_t across time from -90 to +30. Using this method assumes that the AR_t s are independent and identically, normally distributed across time. Since the event dates are not uniform with respect to calendar time, the assumption of independence should not be violated. If the assumption is violated, and the AR_t s are not independent, the statistic will be overstated. Brown and Warner's (1980) simulation study concluded the t -test was superior to other tests in event studies.

A test statistic is computed for the cumulative abnormal returns over various intervals T_1 to T_2 . This statistic is the one originally reported in Brenner (1979) and is computed as follows:

$$T = \frac{CAR_{T_1, T_2}}{CSD_{T_1, T_2}}. \quad (6)$$

The CAR_{T_1, T_2} is the change in CAR over the interval. CSD is the cumulative standard deviation. It is found by summing the cross-sectional variances of the AR_t at each time t during the specified interval and dividing by N . The square root is taken to provide the standard deviation.

For this study, if the securities' market viewed the death of a key executive as negative information, the test statistics for the AR_t s and CARs around the time of the announcement will

be statistically negative. However, if a key executive's death was considered irrelevant, the test statistics will show the ARs and CARs to be insignificantly different from 0.

The single-index market model has been criticized particularly for the nonsynchronous data problem described by Scholes and Williams (1977). However, Brown and Warner (1983) concluded that procedures for correcting nonsynchronous data are unnecessary. Furthermore, Brown and Warner (1980) and Brenner (1979) concluded that the market model reaches correct conclusions at least as often as more complex models. In addition, Davidson (1984) found that alternate specifications of the predictive model, even including an industry factor, did not qualitatively change the conclusions obtained with the market model.

To confirm the results obtained with the market model, we also used the average return model to generate the normal returns. The procedure is similar to that for the market model, except that instead of using first-pass regressions to estimate the model's parameters, α_i (the regression intercept) is defined as 0, and the slope, β_i , is defined as 1. The use of the average return model permits the computation of the abnormal returns and the cumulative abnormal returns without relying on potentially unstable market parameters.

One final potential problem with this methodology is the possible presence of heuristic noise in the data. For example, other major announcements that affect value may affect the return series of the firms studied. If these announcements are unrelated to the deaths of the key executives and are therefore random with respect to the event time, they generally have little effect on reported events. This is especially true with large sample sizes, because of the averaging process shown in Equation 3.

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RESOURCE SHARING AMONG SBUs: STRATEGIC ANTECEDENTS AND ADMINISTRATIVE IMPLICATIONS

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Despite widespread resource sharing among strategic business units (SBUs), questions such as when resource sharing is desirable and what its administrative implications are have rarely been examined. In this study, data from 58 SBUs revealed that (1) the utility of resource sharing depends on an SBU's competitive strategy, (2) the optimal specification of incentive systems for general managers of SBUs is a function of magnitude of resource sharing, and (3) resource sharing has a negative effect on the job satisfaction of general managers.

Given a conceptualization of strategy as providing both external direction and internal integration to organizations, the concept of synergy is central to the field of strategic management (Ansoff, 1965; Hofer & Schendel, 1978). For single-business firms, this centrality is evident in the emphasis previous researchers have given to interfunctional coordination (Andrews, 1971; Galbraith, 1973; Lawrence & Lorsch, 1967). For diversified firms, it is evident in the emphasis that proponents of portfolio planning models have given to financial synergy (Abell & Hammond, 1979; Henderson, 1970) and that scholars studying performance differences between related and unrelated diversified firms have given to operating synergy (Bettis, 1981; Christensen & Montgomery, 1981; Rumelt, 1974, 1982; Stubbart & Grant, 1983). Notwithstanding its apparent desirability, it is critical to note that the outcome of pursuing synergy is not always positive (Ansoff, 1965; Kay, 1982; Weick, 1976). Because 2 plus 2 can add up to 3 rather than the hoped-for 5, it would seem to be extremely important for managers to know when to pursue synergy, how to pursue it, and what effect this pursuit might have on the actors involved. Despite the obvious practical significance of these questions, they have rarely been examined—the few exceptions being Lorsch and Allen (1973), Pitts (1974, 1976, 1977, 1980), and Vancil (1980). The objective of this study was to shed further light on this subject by focusing on the

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special, but significant, case of operating synergy among strategic business units (SBUs). By operating synergy, we refer specifically to sharing of functional resources by two or more SBUs within a single firm; the Norton Company, whose domestic coated abrasives SBU shares a common sales force with its domestic bonded abrasives SBU, and a common R&D facility with its international coated abrasives SBU, is an example (Aguilar, 1976).

THEORETICAL BACKGROUND

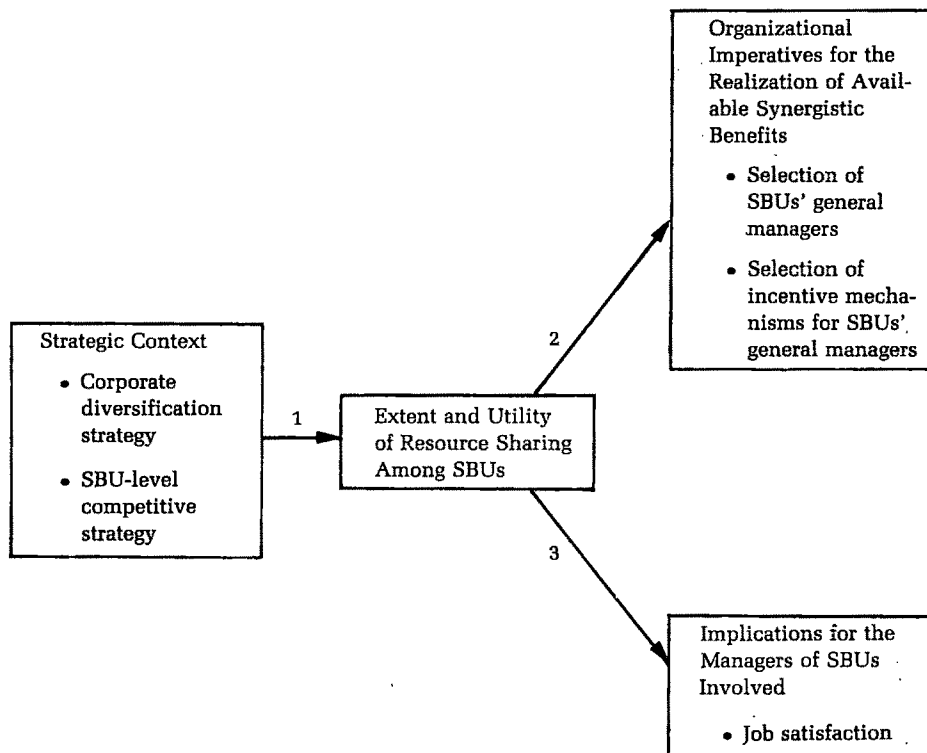
Resource sharing among SBUs is conceptually analogous to a non-zero-sum game, the outcome of which depends on the rules of the game as well as the actions of the players (Luce & Raiffa, 1957). It can also be viewed as a special form of governance structure within M-form, or multidivisional, firms. The desirability of such a structure depends on the magnitude of the associated transaction costs—a function of both the contexts of transactions and the manner in which human assets are governed under particular structures (Williamson, 1975, 1981). These analogies yield two of the three basic premises underlying the present study: the potential for synergistic benefits from resource sharing varies across strategic contexts, and the realization of these potential synergistic benefits depends on how effectively linkages between SBUs are actually managed. A third and related premise, derived from neither game theory nor analysis of transaction costs, is that the pursuit of synergy may well have divergent implications for the firms and the key actors involved; although the pursuit of synergy may improve organizational performance, it may also reduce job satisfaction among SBUs' managers by curtailing their autonomy. These premises, represented schematically in Figure 1, form the basis for the development of the specific hypotheses we tested.

Strategic Antecedents and the Utility of Resource Sharing

Strong theoretical arguments exist for expecting that the utility of resource sharing among SBUs will depend on the strategic contexts of both corporations and their SBUs. Focusing exclusively on corporate diversification strategies, Pitts (1977) argued that internal diversifiers opt for high synergy because it enables firms to use the resources of their current divisions to compete in new fields; in contrast, acquisitive diversifiers opt for low synergy because acquired managers, having already become accustomed to great independence in managing their firms prior to acquisition, may be assumed to put a high value on retaining their independence afterwards. Consistent with this conceptualization, Vancil's (1980) empirical study also reported that, for each of the four functions examined (R&D, manufacturing, distribution, and selling), the incidence of resource sharing was greater within related diversified firms than within unrelated diversified firms.

Unlike linkages between the utility of resource sharing and corporate strategic contexts, possible linkages between the utility of resource sharing and SBUs' strategic contexts have remained completely unexplored either

FIGURE 1
Premises Underlying This Study^a



^aPaths 1, 2, and 3 are the three basic premises underlying this study.

conceptually or empirically. Empirical evidence on how resource sharing among SBUs affects performance has been very consistent and clear: "The highest levels of profitability were exhibited by those [firms] having a strategy of diversifying primarily into those areas that drew on some common core skill or resource" (Rumelt, 1982: 359; cf. Bettis, 1981; Christensen & Montgomery, 1981). Given consistent support, such a finding might lead to the conclusion that, where it is feasible, high resource sharing always contributes positively to performance. However, as several authors (McCann & Galbraith, 1981; Pondy, 1970; Porter, 1981; Rumelt, 1982) have argued, the scale advantages of resource sharing do not come cost-free. At the level of clusters of SBUs, there are the costs of coordination; at the level of individual SBUs, there are the costs of reduced flexibility, because sharing resources reduces SBUs' managers' independence with respect to the allocation of those resources and reduces their flexibility in responding to unanticipated

competitive moves. Thus, the scale benefits of resource sharing must constantly be weighed against the costs of coordination and reduced flexibility.

According to Porter's (1980) conceptualization, supported empirically by Dess and Davis (1984) and Hambrick (1983), the two generic bases for developing a strategic advantage over competition are differentiation and overall cost leadership. A strategy of differentiation—exemplified by Mercedes-Benz in automobiles—implies “creating something that is perceived industry-wide as being unique” (Porter, 1980: 37). In contrast, a strategy of overall cost leadership—exemplified by Lincoln Electric in arc welding equipment—requires “aggressive construction of efficient-scale facilities, vigorous pursuit of cost reductions from experience, tight cost and overhead control, avoidance of marginal customer accounts, and cost minimization in areas like R&D, service, sales force, advertising, and so on” (Porter, 1980: 35). Thus, given both the pros and cons of resource sharing, it seems that the competitive advantages yielded by the scale benefits of high resource sharing are more critical for SBUs pursuing a strategy of low cost rather than differentiation.

Hypothesis 1: Resource sharing (R) will make a greater contribution to SBUs' effectiveness (E) at the low cost than at the differentiation end of the strategy (S) spectrum. In mathematical terms, $\partial E/\partial R$ will be greater when S is low than when it is high.

The specific form of the contingency relationship between resource sharing and competitive strategy this hypothesis postulates does allow for the possibility that resource sharing may be beneficial in either context; this would be so if $\partial E/\partial R$ had a positive value over the entire observed range of S. The contingency prediction is that, if so, the marginal utility of resource sharing ($\partial E/\partial R$) will be greater when business units pursue strategies of low cost rather than of differentiation.

Managing Resource Sharing: Some Organizational Imperatives

Galbraith and Nathanson's (1978) extensive review of the literature on strategy implementation concluded that the effective execution of any strategic task requires appropriate organizational arrangements, embracing structure, information and decision processes, people, and reward systems. Focusing on the last two of these four organizational elements, we examined the role that (1) organizational familiarity on the part of SBUs' managers, and (2) the incentive systems controlling these managers played in the effective management of resource sharing among SBUs.

Organizational familiarity. The longer an individual has worked for an organization, the more familiar that person is likely to be not only with its products, markets, and technologies, but also with its people, standard operating procedures, and culture. Although familiarity with products, markets, and technologies can develop through experience within an industry but outside a focal organization, experience within an organization seems essential to knowing and understanding its people, procedures, and culture. Thus,

the greater the relevance of knowing people, procedures, and culture for the implementation of a particular SBU's strategy—"human asset specificity" in Williamson's terminology (1981: 563)—the more important organizational familiarity is likely to be.

The greater the extent of resource sharing under which an SBU operates, the more its general manager must rely on peers and superiors to implement its strategy. Although a manager can plan for anticipated marketplace and competitive events, the indeterminacy of the real world ensures that unexpected external events will almost always occur. The response to these unexpected events must involve coordination and negotiation with the general managers of peer SBUs, managers in charge of shared resources, and superiors. As Galbraith (1973) and Kotter (1982) argued extensively, the stronger the informal, interpersonal relationships between a focal general manager and peers and superiors, the greater the manager's effectiveness is likely to be in getting their cooperation in responding to unexpected events.

Hypothesis 2: A general manager's organizational familiarity (F) will make a greater contribution to an SBU's effectiveness (E) when resource sharing (R) is high. In mathematical terms, $\partial E/\partial F$ will be greater when R is high than when it is low.

Incentive systems. Salter (1973) identified six components of the overall financial incentive system for general managers of SBUs: the performance criteria used to determine the amounts of bonuses; the reliance placed on subjectivity, as contrasted with prespecified formulas, in determining bonuses; the effect of corporate, as compared to SBU's, performance on the size of the bonus pool; the size of bonuses relative to basic salary; the frequency of bonuses; and, finally, the form (cash, equity, options, etc.) of bonuses. This study focused on the implications of resource sharing for only two of these six components: (1) extent of reliance on subjectivity as opposed to formulas, and (2) determination of bonus pools. The other four components appeared less critical in light of our narrow focus on resource sharing.

A bonus award for any general manager of an SBU can be determined on the basis of either a strict formula, such as a percentage of the SBU's operating profit, or through a purely subjective assessment by the manager's superior, or by some combination of the two. Exclusive reliance on objective formulas for determining bonuses has some clear merits: reward systems can be specified with great precision, and superiors cannot exercise any bias in assessing the performance of general managers nor determine their rewards ex post facto. However, a major limitation of objective formulas is that they are likely to induce managers to pay less attention to the performance of their SBUs along dimensions that are difficult to quantify, yet important—dimensions like R&D and human resource management. Although some subjectivity in assessing bonuses might thereby be desirable in all SBUs, we argue that the utility of a subjective approach is likely to be high when a general manager's personal control over an SBU's performance is low. In such situations, numerical indicators of the SBU's performance have little

validity as surrogates for the performance of the individual manager. This occurs with high resource sharing, because it reduces each general manager's discretion over how functional resources are used and results in both partial loss of control over an SBU's performance and contamination of performance by the decisions and actions of outside individuals (Lorsch & Allen, 1973; Pitts, 1980; Salter, 1973; Vancil, 1980). Thus, where resource sharing is high, greater reliance on subjectivity in determining bonuses is likely to be particularly desirable. More formally,

Hypothesis 3: Reliance on subjective, as opposed to formula-based, approaches for determining a general manager's bonus (B) will make a greater contribution to an SBU's effectiveness (E) for SBUs with high resource sharing (R). In mathematical terms, $\partial E/\partial B$ will be greater when R is high than when it is low.

Salter stated that "bonus pools can be based on divisional (SBU) performance, total corporate performance, or some mix of the two. Each arrangement sends different signals in terms of interdivisional cooperation" (1973: 100). If an SBU is essentially autonomous, engaging in almost no resource sharing with other SBUs, tying its manager's bonus to the performance of a cluster of several SBUs would weaken the link between performance and reward and, therefore, is likely to be counterproductive; in such situations, a bonus should arguably be determined on the basis of the SBU's performance only. In contrast, if a group of SBUs form a tightly knit cluster, owing to a high degree of resource sharing, linking the size of a bonus pool to the performance of the cluster as a whole should foster greater cooperation among SBUs than would tying each general manager's bonus solely to the performance of each individual's SBU. One of Lorsch and Allen's (1973) anecdotes is particularly illustrative: "[Firm 3] had undertaken a bold attempt to get three divisions to collaborate in providing a complex system of products to the government. A central office was set up at the corporate level to integrate this effort. The program immediately ran into the parochial interests of each division . . . Basically, each division manager was more motivated to focus on his own differentiated goals than those of the corporation. In effect, this is what the control and reward system told him he should do" (1973: 114). Thus,

Hypothesis 4: Linking the bonus of an SBU's general manager only to the focal SBU's performance ($P = 1$) will be more beneficial for SBUs with low resource sharing. In contrast, linking a bonus to the performance of an entire cluster of SBUs ($P = 2$) will be more beneficial for SBUs with high resource sharing. In mathematical terms, for $P = 1$, effectiveness (E) will correlate negatively with resource sharing (R); for $P = 2$, the correlation between E and R will be positive.

Effect of Resource Sharing on Managers' Job Satisfaction

Research findings relating to the effects of alternative leadership styles on the job satisfaction of subordinates are the primary basis for expectations of linkages between resource sharing among SBUs and the job satisfaction of general managers of SBUs (Beer, 1964; Fleishman & Harris, 1962; Pennings, 1975; Schriesheim, House, & Kerr, 1976; Tannenbaum, 1962; Trow, 1957). These studies have indicated that the greater the initiative taken by leaders in making decisions that subordinates must follow, the less satisfied subordinates seem to be, even though organizational performance is high. The theoretical explanation is that people's job satisfaction increases with the magnitude of their personal control over the context of their jobs. Studies on the implications of locus of control (Rotter, 1966) for job satisfaction provide secondary support for this premise; individuals who report less personal control over their environments, designated as externally controlled in Rotter's terminology, generally are less satisfied with their job contexts (Organ & Greene, 1974; Szilagyi, Sims, & Keller, 1976).

Several researchers (Heany & Weiss, 1983; Porter, 1981; Stengrevics, 1984; Vancil, 1980) have argued that the greater the extent of resource sharing among SBUs, the greater is the need for superiors (typically, group vice-presidents) to take active roles, not just in coordinating interdependent SBUs' decisions, but also in setting the SBUs' strategies. As Porter (1981) stated: "It is axiomatic from the principles of cluster strategy that the final authority over the strategies of business units in the cluster should reside at the cluster executive level and not the business unit level. Furthermore, the cluster executive must view his role as initiating cluster strategy rather than responding to business unit proposals. Business units acting independently simply will not propose the strategies necessary to centralize certain activities" (1981: 43). Thus, we expect that the greater the magnitude of resource sharing, the greater is the probability that an SBU's general manager will see critical strategic decisions concerning the SBU being handed down from above. Combining this expectation with an awareness of the results on linkages between degree of personal control and job satisfaction cited earlier in this section yields the following hypothesis:

Hypothesis 5: The greater the magnitude of resource sharing (R), the less satisfied the general managers of SBUs will be with their overall job contexts (T). In mathematical terms, T will correlate negatively with R.

METHODS

Data were collected from the general managers of 58 SBUs within eight diversified, Fortune 500 firms headquartered in the northeastern United States. Applying Rumelt's (1974) criteria, we classified six of these as related diversified and two as unrelated diversified firms. Although constraints on access, time, and funding prevented the use of a random sample, the range of sizes (from \$500 million to \$10 billion in sales) as well as the diversity of

these firms' outputs (consumer as well as industrial products in both mature and high-growth industries) indicate no *prima facie* reason to expect any systematic bias in the findings from SBUs within these firms. Nonetheless, given the variations in corporate diversification strategies and their potential for confounding predicted relationships, we controlled for diversification strategy in testing the hypotheses.

Within each firm, a corporate senior executive was interviewed and persuaded to send a questionnaire to four or more general managers of SBUs, thus ensuring a mix of strategically diverse businesses. A cover letter accompanying the questionnaires guaranteed anonymity to respondents and assured them that only aggregate data from multiple business units would be published. Out of the 70 questionnaires distributed by corporate executives, we received 58 usable answers, 48 from the six related diversified firms and 10 from the two unrelated diversified firms. Because of the high response rate (83%), we did not consider tests for nonresponse bias necessary.

Measurements

The seven variables of interest were an SBU's degree of resource sharing with other SBUs, its effectiveness in implementing strategy, its competitive strategy, its general manager's organizational familiarity, subjectivity in bonus assessment, determination of bonus pool, and its general manager's job satisfaction. The Appendix gives details of measurement and of tests for reliability and validity. Table 1 contains summary statistics as well as the matrix of zero-order correlation coefficients for all these variables. There are no standard instruments for measuring any of these variables except job satisfaction; consequently, six of the measures represent pioneering attempts. A brief elaboration follows on how the two key variables—resource sharing with other SBUs, and SBUs' effectiveness in implementing strategy—were measured.

Since this study focused on SBUs as nodes, not as dyads or clusters, we measured resource sharing in terms of the extent to which focal SBUs shared functional facilities like sales forces or manufacturing plants with all other SBUs in their corporations. From this perspective, we took two types of variations in resource sharing into account: (1) For any focal SBU, the extent of resource sharing was predicted to vary across different functional areas like marketing, production, and purchasing (McCann & Galbraith, 1981; Vancil, 1980). (2) We predicted different functional areas to be differentially important, not only within, but also across, SBUs (Gupta & Govindarajan, 1984; Hitt, Ireland, & Palia, 1982; Snow & Hrebiniak, 1980; Song, 1982), implying thereby that equal degrees of resource sharing need not be equally salient across different functions. Thus, we measured resource sharing at the level of focal SBUs and computed it in the form of a weighted, not a straight, average across various functions, with the importance of these functions serving as the weights assigned to different degrees of functional resource sharing.

TABLE 1
Summary Statistics and Zero-Order Correlations for All Variables^a

Variables	Minimums	Maximums	Means	s.d.	1	2	3	4	5	6	7
1. SBU's effectiveness	1.463	4.800	3.205 ^b	0.739							
2. Degree of resource sharing with other SBUs	1.000	4.826	2.408 ^d	0.822	.16						
3. Competitive strategy	5.000	10.000	7.793 ^b	1.239	.02	-.11					
4. General manager's years with firm	1.000	11.000	9.828 ^c	2.792	.27*	.01	.13				
5. General manager's years on current job	1.000	11.000	4.259 ^b	3.401	.25*	-.08	.14	.29*			
6. Subjectivity in bonus assessment	0.000	100.000	26.811 ^b	32.891	.11	-.04	-.17	-.22*	.16		
7. Determination of bonus pool	1.000	2.000	1.772 ^c	0.423	.00	.21	.11	.25*	.22*	.17	
8. General manager's job satisfaction	6.000	15.000	11.140 ^b	2.445	.01	-.22*	-.00	-.18	-.17	.06	-.01

^a N = 58 SBUs.

^b Mean values did not differ significantly either across firms (ANOVA) or across corporate diversification strategies (t-test).

^c Mean values differed significantly across firms (ANOVA) but not across corporate diversification strategies (t-test).

^d Mean values differed significantly across firms (ANOVA) as well as across corporate diversification strategies (t-test). As expected, the mean degree of resource sharing for the 48 SBUs belonging to the six related diversified firms was significantly greater ($p < .001$) than that for the 10 SBUs belonging to the two unrelated diversified firms.

* $p < .05$, one-tailed test.

** $p < .01$, one-tailed test.

The measure employed for the effectiveness of business units also reflected the specific theoretical concerns of this study. We anticipated *a priori* that the absolute performance of any business unit would depend not just on its internal organization's effectiveness in implementing a chosen strategy, but also on its industry's characteristics and the choice of strategy itself (Lenz, 1981). Given our focus on implementation, we deemed it essential to control for the effects of factors related to industry and strategy on the performance of SBUs. Since managers' *a priori* expectations about the performance of SBUs are likely to take into account anticipated effects of factors related to industry and strategy, this requirement suggested that a business unit's effectiveness be measured in the form of a comparison between actual performance and *a priori* expectations, rather than on an absolute scale. Further, following reasoning analogous to the arguments concerning the resource sharing measure, we anticipated that (1) for any SBU, effectiveness will vary across different performance dimensions, and (2) the importance of different performance dimensions will vary not only within, but also across, SBUs (Steers, 1975). Consequently, we assessed comparative performance along many dimensions and weighted the various dimensions of performance in terms of their relative importance for the SBUs.

Controlling for Differences Among Firms

Since differences among the eight firms from which the 58 SBUs were drawn could confound the predicted relationships, it seemed important to control for these differences in testing the hypotheses. Concern for parsimony, and both conceptual and empirical concerns, led us to conclude that corporate diversification strategy was the single most meaningful variable through which to control for any such effects. Corporate diversification strategy is the only variable determined by a firm that bears a direct logical relationship with resource sharing among its SBUs, our central variable of interest. In addition, as summarized in Table 1, resource sharing was the only variable in this study whose mean values differed across related and unrelated diversified firms. Finally, of the remaining seven variables, the mean values of five—SBU's effectiveness, competitive strategy, general manager's years on the current job, subjectivity in bonus assessment, and job satisfaction—did not differ either across firms or across corporate diversification strategies. For computation, we made corporate diversification strategy (*D*) a binary variable, assigning the value $D = 0$ to the 48 SBUs from the six related diversified firms and $D = 1$ to the 10 SBUs from the two unrelated diversified firms.

Analysis

Hypotheses 1, 2, and 3 are all of the following form: $\partial E/\partial X_1$ will be greater when X_2 is high (or low) than when X_2 is low (or high):

$$\frac{\partial Y}{\partial X_1} = a_1 + bX_2 \quad ,$$

where, depending upon the hypothesis, b is predicted to be either positive or negative. To control for corporate diversification strategy (D), we modified this equation as follows:

$$\frac{\partial Y}{\partial X_1} = a_1 + (b_1 + b_2 D) X_2 .$$

With this modification, we viewed b_1 as providing the exact test for each hypothesis after controlling for the effects of corporate diversification strategy, and b_2 as capturing any marginal effect of this control variable. For statistical purposes, we then integrated the equation over X_1 and rewrote it as:

$$Y = c + a_1 X_1 + a_2 X_2 + b_1 X_1 X_2 + b_2 D X_1 X_2 .$$

For any independent variable in a multiple regression equation, the significance of the regression coefficient that is computed through a two-tailed t -test always equals the significance of the increase in R^2 caused by the introduction of the particular variable into the equation. Thus, a significant value for b_1 (or b_2) implies that the introduction of the term $X_1 X_2$ (or $D X_1 X_2$) added significantly to the variance explained. At a more general level, it might also be noted that prior research (Argote, 1982; Brownell, 1981; Schoonhoven, 1981) has used this specific model of contingency relationships; Southwood (1978) discussed and supported the mathematical properties of this model at length. Following this equation as a general model, we computed four sets of multiple regression equations, one set each for Hypotheses 1 and 3, and two sets for Hypothesis 2, because organizational familiarity was measured in two different ways. Each set included three regression equations: one with just X_1 and X_2 , a second with $X_1 X_2$ added, and a third that included $D X_1 X_2$ as well. Hypotheses 4 and 5 are stated in straight correlational terms. We tested these by examining the first-order partial correlations, after controlling for the effects of corporate diversification strategy (D).

RESULTS

Table 2 summarizes the results of the multiple regression analyses.¹ Hypothesis 1 stated that $\partial E / \partial R$ will be greater when S is low than when S is high. Here, E represents an SBU's effectiveness; R , resource sharing; and S , competitive strategy, with high values of S implying use of differentiation

¹ The decision to report unstandardized, rather than standardized (beta), regression coefficients in Table 2 was based upon Southwood's (1978) mathematical analysis, which we crosschecked empirically. This analysis indicated that if the points of origin of X_1 and X_2 are changed, then the values as well as the significance levels of both the standardized and unstandardized regression coefficients of the variables X_1 and X_2 will also change. However, for the cross-product terms $X_1 X_2$ and $D X_1 X_2$, the values of the unstandardized, but not the standardized, regression coefficients, their standard errors, and their levels of significance are always independent of the points of origin of X_1 and X_2 . Since virtually all variables in this study are interval-scale variables, their points of origin are arbitrary, rendering the standardized—but not the unstandardized—regression coefficients essentially meaningless.

TABLE 2
Results of Multiple Regression Analyses of Resource Sharing
Among SBUs on SBUs' Effectiveness^a

Results of Equations ^{b,c}	Eq.	R ²	F ^d	ΔR ²	F ^d
Hypothesis 1					
E = 2.685 + 0.146R + 0.022S (.121) (.080)	(1)	.03	0.74		(2,55)
E = -2.688 + 2.347R** + 0.715S** - 0.286RS** (.803) (.262) (.103)	(2)	.15	3.11*	.12	7.67** (3,54) (1,54)
E = -2.676 + 2.349R** + 0.716S** - 0.287RS** - 0.002DRS (.811) (.264) (.104) (.020)	(3)	.15	2.29	.00	0.02 (4,53) (1,53)
Hypothesis 2					
E = 2.183 + 0.070F ₁ * + 0.141R (.034) (.116)	(4)	.10	2.87		(2,55)
E = 1.436 + 0.142F ₁ + 0.463R - 0.031F ₁ R (.127) (.559) (.053)	(5)	.10	2.00	.00	0.35 (3,54) (1,54)
E = 1.426 + 0.149F ₁ + 0.475R - 0.034F ₁ R - 0.008DF ₁ R (.129) (.563) (.054) (.016)	(6)	.11	1.54	.01	0.25 (4,53) (1,53)
E = 2.567 + 0.058F ₂ * + 0.163R (.028) (.116)	(7)	.10	2.93		(2,55)
E = 2.587 + 0.055F ₂ + 0.155R + 0.002F ₂ R (.084) (.218) (.035)	(8)	.10	1.92	.00	0.00 (3,54) (1,54)
E = 2.578 + 0.052F ₂ + 0.157R + 0.002F ₂ R + 0.006DF ₂ R (.085) (.221) (.036) (.029)	(9)	.10	1.42	.00	0.05 (4,53) (1,53)
Hypothesis 3					
E = 3.015 + 0.002B + 0.051R (.003) (.137)	(10)	.02	0.37		(2,55)
E = 3.562 - 0.017B - 0.173R + 0.008BR* (.010) (.169) (.004)	(11)	.10	1.75	.08	4.46* (3,54) (1,54)
E = 3.558 - 0.017B - 0.172R + 0.008BR* - 0.002DBR (.010) (.171) (.004) (.002)	(12)	.10	1.29	.00	0.02 (4,53) (1,53)

^a N = 58.

^b Legend: D = corporate diversification strategy with 0 = related, 1 = unrelated; E = SBU's effectiveness; R = degree of resource sharing with other SBUs; S = competitive strategy; F₁ = general manager's years with firm; F₂ = general manager's years on current job; B = subjectivity in bonus assessment.

^c Figures in parentheses represent standard errors.

^d Figures in parentheses represent degrees of freedom.

* p < .05, two-tailed t-test.

** p < .01, two-tailed t-test.

rather than low cost as a strategy. On the basis of the discussion leading to the last equation, this hypothesis reduces to

$$E = c + a_1R + a_2S + b_1RS + b_2DRS,$$

where b_1 is predicted to be negative. Results in Table 2 (Equations 2 and 3) indicate strong support for this hypothesis ($b_1 = -.287$, $p < .01$). Corporate diversification strategy was found not to have any significant confounding effect ($b_2 = -.002$, n.s.).

Hypothesis 2 stated that $\partial E/\partial F$ will be greater when resource sharing (R) is high than when it is low; F represents organizational familiarity. Mathematically, this hypothesis reduces to

$$E = c + a_1F + a_2R + b_1FR + b_2DFR,$$

where b_1 is predicted to be positive. Results shown in Table 2 (Equations 5, 6, 8, and 9) do not support this hypothesis for either measure of organizational familiarity. However, as the zero-order correlations in Table 1 indicate, the general manager's tenure in a firm and in a job do correlate positively with an SBU's effectiveness. Thus, the lack of support for Hypothesis 2 leads to the conclusion that, although organizational familiarity is positively associated with the effectiveness of SBUs, this association does not differ for different levels of resource sharing. Since this finding is inconsistent with Kotter's (1982) findings from case studies, as well as with the implications of Galbraith's (1973) and Williamson's (1981) theories, it seems prudent to await further empirical studies before rendering a final judgment on the validity of Hypothesis 2.

Future research could also help sort out the three possible explanations for the direct and positive correlation between tenure and effectiveness: (1) longer tenure might facilitate the development of a general manager's understanding of an SBU's internal and external environments, thereby enhancing its effectiveness; (2) effective managers might be more likely to be allowed to continue on their current jobs and with their current firms; or (3) managers with long tenure might be more likely to perceive themselves as effective.

Hypothesis 3 predicted that $\partial E/\partial B$ will be greater when resource sharing (R) is high than when it is low; B is the percent of an SBU's general manager's bonus that is determined subjectively.

$$E = c + a_1B + a_2R + b_1BR + b_2DBR,$$

where b_1 is predicted to be positive. Results shown in Table 2 (Equations 11 and 12) support this hypothesis ($b_1 = .008, p < .05$). Corporate diversification strategy was found not to have any confounding effect ($b_2 = .000, n.s.$)

Hypothesis 4 predicted that, for $P = 1$, effectiveness (E) would correlate negatively with resource sharing (R), and that for $P = 2$, this correlation would be positive. Here, $P = 1$ when the size of a bonus pool depends solely on the performance of a focal SBU, and $P = 2$ when the size of a bonus pool depends on the performance of a cluster of SBUs, including a focal SBU. For $P = 1$ (13 SBUs), the zero-order correlation between effectiveness and resource sharing is negative, as expected, but not significant ($r = -.09, n.s.$). With corporate diversification strategy controlled, the first-order partial correlation comes to $-.08$ ($n.s.$). For $P = 2$ (43 SBUs), the zero-order correlation between E and R is positive, as expected, but only marginally significant ($r = .22, p = .08$). The first-order partial correlation after controlling for corporate diversification strategy comes to $.17$ ($n.s.$). Thus, the data provide some, albeit very weak, support for Hypothesis 4.

Hypothesis 5 predicted that the greater the resource sharing, the less satisfied the general managers of SBUs would be with their overall job contexts.

As Table 1 indicates, the zero-order correlation between these two variables is $-.22$ ($p < .05$). Controlling for corporate diversification strategy, the first-order partial correlation comes to $-.21$ ($p = .058$). Thus, the results seem to support Hypothesis 6. Parenthetically, it might also be noted from Table 1 that job satisfaction exhibits no correlation whatsoever with SBUs' effectiveness. Such a result is entirely consistent with Bhagat (1982); he reported a positive association between performance and satisfaction only in those contexts in which participants were under neither time nor organizational pressure to perform—a situation highly unlikely to prevail for the general managers in this study.

DISCUSSION AND CONCLUSIONS

Resource sharing among SBUs is a widespread and growing phenomenon within American corporations (Rumelt, 1974, 1982; Vancil, 1980). Further, there are several reasons to expect that this trend will continue over the foreseeable future: (1) the emergence of flexible manufacturing systems should more easily permit common production facilities for SBUs selling different but closely related products; (2) the spreading information processing technology should permit a more economical interlinking of SBUs than might have been feasible earlier; (3) capital markets continue to place a premium on related, as compared to unrelated, diversification; and (4) certain heretofore independent industries are currently merging and evolving into more complex and internally linked industries, such as offices of the future, financial services, and flexible manufacturing systems (Porter, 1981).

Despite the clear salience of resource sharing among SBUs, researchers have only recently begun to examine such questions as when it is desirable and how it might be managed (Pitts, 1980; Porter, 1981; Vancil, 1980). Further, no one except Vancil has attempted a large-scale empirical examination of these issues. Within this context, we employed survey data from 58 SBUs, which yielded the following results: (1) resource sharing makes a greater contribution to effectiveness for SBUs pursuing a strategy based on low cost rather than on differentiation; (2) subjective, rather than formulaic, approaches for determining bonuses of SBUs' general managers are more beneficial where resource sharing is high; and (3) resource sharing has a negative effect on the job satisfaction of the general managers of SBUs. There was also some, albeit weak, support for the hypothesis that linking the bonus of an SBU's general manager to the performance of the SBU's cluster is more beneficial in SBUs with high degrees of resource sharing.

The *practical* implications of this study lie in the guidance that corporate executives might draw regarding when to foster resource sharing among SBUs and how to manage it. It is conceivable that, without such differentiating guidelines, managers might find themselves pulled in opposing directions. The demonstrated superior performance of related diversified firms (Rumelt, 1974, 1982) might imply that resource sharing is inherently and universally desirable; at the same time, the currently emerging wisdom that small, independent business units provide superior contexts for creativity and innova-

tion (Pinchot, 1985) might imply that resource sharing is inherently and universally undesirable. The results of this study suggest that a contingency approach that recognizes systematic variations in the utility of resource sharing across different types of strategies used by SBUs might be more advisable than either of the two alternative universalistic approaches. The results of this study also reinforce perspectives on the design of incentive systems for SBU's general managers. Our earlier study (Govindarajan & Gupta, 1985) concluded that the design of incentive systems for general managers of SBUs should be contingent on business units' strategic missions. The results of this study extend this perspective and indicate that the appropriateness of particular incentive systems is likely to depend on multiple contingencies, including strategic mission and extent of resource sharing. Finally, corporate executives might note the overall negative effect of resource sharing on job satisfaction; thus, the selection of highly individualistic managers to serve as the general managers of SBUs with high resource sharing might be particularly inadvisable, because of the greater likelihood of high turnover among such managers.

The *theoretical* implications of this study lie in the extension of contingency perspectives from the level of entire corporations to the level of strategic business units. All prior studies on the subject of synergies among SBUs (Lorsch & Allen, 1973; Pitts, 1980; Vancil, 1980) treated entire firms as units of observation and focused on such questions as how a related diversified firm like General Electric might be managed differently from an unrelated diversified firm like Textron. In contrast, we regarded individual SBUs as the units of observation; further, the results continue to support the hypothesis after we controlled for variations in corporate diversification strategy. To the extent that some SBUs, even within unrelated diversified firms, can have higher resource sharing than other SBUs within related diversified firms, the results of this study suggest that conceptualizations regarding the effective management of SBUs might be better justified theoretically and better supported empirically if developed primarily at the level of individual SBUs and only secondarily at the corporate level.

As a guide to future empirical research, it is prudent to also examine some of the key limitations of this study. Perhaps the most obvious limitation is that our data are self-reported and perceptual. Although we believe that the results of our reliability and validity tests lend substantial credibility to our measures, a similar study using objective or multirater measurements should be undertaken to replicate these results. Another limitation of this study is that our one-time data resemble a snapshot. Although the theoretical discussion preceding the hypotheses implies a specific causality in each case, the cross-sectional and snapshot-like nature of the data prevented any tests for such causality. Longitudinal studies would arguably be a more appropriate methodology for the examination of specific causal linkages.

Methodology aside, this study also has limitations in certain substantive areas. We conceptualized resource sharing in terms of its magnitude solely from the perspective of focal SBUs. However, resource sharing is a relation-



ship of interdependence among two or more SBUs. In order to capture the implications of such interdependence, a perhaps more powerful approach would be to examine an entire set of SBU clusters rather than a set of isolated SBUs from different clusters. Second, linkages between resource sharing and strategy need to be examined in terms of strategy, at not only the business unit, but also the corporate, level. Besides corporate diversification strategy, the notion of multiple point competition (Karnani & Wernerfelt, 1983; Porter, 1981) might also prove useful in this regard. If two multiple point competitors, A and B, are diversified in the same set of industries, but A enjoys relatively greater economies of scale because of more resource sharing, it is conceivable that competitive factors might force B to bring about a similar level of resource sharing among its SBUs. An investigation along these lines might well explain Rumelt's unexpected discovery that "related constrained" (1982: 360) firms, which are likely to have the highest levels of resource sharing, tended to be concentrated in a common set of industries.

Finally, this study focused on only a few of the administrative mechanisms available to corporate executives for managing resource sharing. Other administrative mechanisms that future research might usefully examine are design of the organizational structures of clusters of SBUs, design of strategic planning and budgeting systems, design of management information systems, management development and career planning, and the accounting policies used for transfer pricing and the allocation of joint costs.

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APPENDIX

Resource sharing with other SBUs. For each of six functions (manufacturing, marketing/sales, R&D, purchasing, government liaison, other administrative activities), two questions were posed to respondents. The first sought data on a function's importance in implementing a focal SBU's strategy; the second sought data on the extent of resource sharing between the focal and one or more other SBUs. Both questions used 5-point scales, ranging from 1 = of little importance to 5 = extremely important and from 1 = almost none to 5 = a very great deal, respectively. Using the data on the importance of various functions as weights, we then derived a weighted-average measure of the extent of resource sharing for each SBU. Two additional questions were posed to test for construct validity. Respondents were asked the percentage of working time they spent in interaction with peers within their corporations, outside of their SBUs. Consistent with McCann and Galbraith (1981), the resource sharing index correlated positively (Pearson $r = .28$, $p < .05$, one-tailed test) with time spent interacting with peers. The second question, patterned after Tannenbaum (1968), concerned the degree of influence that superiors and respondents had on the formulation of the SBUs' annual operating budgets. The ratio of respondent's influence divided by superiors' influence provided a measure of each general manager's perceived autonomy. Consistent with Vancil (1980), the resource sharing index correlated negatively ($r = -.25$, $p < .05$) with this measure of autonomy.

Business unit effectiveness. Data on effectiveness were collected on rate of growth in sales, market share, operating profits, profit-to-sales ratio, cash flow from operations, return on investment, new product development, market development, R&D activities, cost reduction programs, personnel development, and political/public affairs. On each of these 12 dimensions, respondents rated their SBUs' performance relative to superiors' expectations on a 5-point scale ranging from not at all satisfactory to outstanding. Using as weights the data on dimensional importance that came from validating the competitive strategy index, we obtained a weighted-average effectiveness index for each SBU. As the summary statistics on this variable show (Table 1), the effectiveness index correlates with neither resource sharing nor competitive strategy, indicating that we adequately controlled for the effects of strategic context on performance. Concerning our use of self-reports, we note that Heneman (1974) reported a very high correlation between superiors' and self-ratings in situations in which subordinates are guaranteed anonymity and understand that the objective of data collection is scientific, not evaluative. Heneman's conditions were met fully in this study.

Competitive strategy. To assess competitive strategies, we asked respondents to use a 5-point scale, ranging from significantly lower to significantly higher, to position their products relative to competitors' in two areas: performance and price. We used the sum of responses to the two items as a measure of each focal SBU's competitive strategy, with higher values indicating a strategy stronger on differentiation and lower values indicating a strategy stronger on low costs ($\alpha = .61$). Although somewhat weak, this reliability estimate is well above Nunnally's (1967) satisfactory minimum ($\alpha = .50$) for exploratory research. To test for construct validity, we also asked each respondent to rate each of 12 performance dimensions on a 5-point scale, ranging from of little importance to extremely important, as to the degree of importance superiors attached to the SBU's performance on that dimension. Responses on this importance question were consistent with expectations (Porter, 1980). The competitive strategy index correlated positively with the importance of new product development (.24, $p < .05$), market development

(.32, $p < .01$), and R&D (.23, $p < .05$), but negatively with the importance of cost reduction programs (-.17, $p < .10$).

Organizational familiarity. This study used two separate, but highly correlated, measures of organizational familiarity. Respondents indicated the number of years spent (1) on their current jobs, and (2) with their current firms. The responses were coded as 0 = less than 1 year, 2 = 1 to 3 years, 5 = 4 to 6 years, 8 = 7 to 9 years, 11 = 10 years or more.

Incentive systems. Two questions were used to collect data on the two different dimensions of the incentive systems under which the respondents operated. To assess the extent of superiors' reliance on subjective assessments in determining the bonuses of SBUs' general managers, we asked respondents to indicate whether their bonuses were calculated strictly by formula, or whether superiors determined all or some percentage in a discretionary manner. The percentage of bonus decided in a discretionary manner ranged from 0 to 100 percent, with a mean of 26.8 percent. To assess the effects of corporate (vs. SBUs') performance on bonus pools, we asked respondents to indicate if the sizes of bonus pools from which they received shares were based solely on their own SBU's performance (coded as 1) or on the performance of a larger organizational grouping including their own and other SBUs (coded as 2). Most of the respondents (77%) checked the second option.

General manager's job satisfaction. Three items from Van de Ven and Ferry's (1979) 6-item instrument were used to assess the respondents' satisfaction with their job contexts: satisfaction with current job, career progress made in this organization up to now, and chances for career advancement in this organization in the future ($\alpha = .77$, additive measure).

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PREDICTORS OF THE PERFORMANCE OF PROJECT GROUPS IN R & D ORGANIZATIONS

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Results from 32 project groups in a large R&D organization showed that group cohesiveness, physical distance, job satisfaction, and innovative orientation were associated with performance of projects. Hierarchical regression analyses revealed that group cohesiveness accounted for unique variance in four performance criteria, both contemporaneously and one year later. An innovative orientation added unique variance to the quality of projects as rated initially by group members and as rated by management one year later. Type of R&D moderated the relationship between innovative orientation and members' ratings of project quality, in that a significant relationship was found for research projects, but not for projects engaged in product development or technical service.

Project groups have become a favorite means by which organizations that do R&D, and other high-technology organizations, conduct their work. The major advantages of project groups are their ability to bring together scientists and engineers from several disciplines, the focusing of responsibility for integration and task completion on project managers who work at the group level, and the flexibility of their structure and duration (Katz & Allen, 1985). Research on project groups' activities generally has focused on the interpersonal communications by which scientific and technological information is imported into project groups, transformed into technological innovations, and then exported to larger R&D contexts or to external units. Katz (1982) developed a model of communication's antecedents, internal and external communications, characteristics of projects, and performance of projects that was used to organize the prior literature and to generate several of the hypotheses for this research.

The antecedents of communication that have been prominent in the literature include the longevity, cohesiveness, and size of a group, and physical propinquity. Katz (1982) and Smith (1970) found curvilinear relationships between the mean tenure of members in project groups and ratings of their groups' performance. Smith, however, found positive linear relationships between mean group tenure and group performance as measured by patents and technical papers. These researchers saw a lack of development of necessary role and status relationships in groups with low mean tenure,

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and suggested that groups with high mean tenure may have isolated themselves from important outside sources of information. Pelz and Andrews (1976) also found this curvilinear relationship, but they found that projects with long-tenured members and high group cohesiveness could generate an intellectual competitiveness that maintained high performance ratios. In prior research, group cohesiveness itself has been an important variable for understanding the performance of groups. For example, O'Keefe, Kernaghan, and Rubenstein (1975) found cohesive scientific workgroups to be more likely to adopt innovations than noncohesive groups. Griffith and Mullins (1972) examined groups of researchers that had made major changes in their particular fields of science and found them to have high levels of communication and organization that gave them the cohesive bonds needed to advance revolutionary changes in the face of resistance from other scientists.

Physical propinquity, measured in terms of the locations of the desks of scientists and engineers in an R&D organization, has been found to be directly related to the communication of scientific and technological information (Allen, 1977; Keller & Holland, 1983). Physical propinquity enhanced the ability of professional employees to communicate with one another about accomplishing tasks. Reviews of the general literature on small groups point out that the size and performance of groups may also have a curvilinear relationship (McGrath, 1984; Shaw, 1981). Up to a point, group performance tends to increase with size, owing to the added knowledge of the additional members. Past an optimal size, however, performance often decreases because subgroups develop and coordination involves costs.

The internal and external communications of both project and functional managers affect the performance of project groups. Katz and Allen's (1985) study of project groups' performance in a matrix R&D organization found performance to be highest when project managers were influential on administrative matters and functional managers were influential on technical aspects of tasks. Hence, a balance between project and functional managers within their respective areas of expertise was associated with high performance of project groups.

The literature on performance, innovativeness, and communication relating to individuals in R&D organizations suggests that certain variables are likely candidates for explaining project groups' performance in R&D settings. Specifically, individuals who perform well have been found to have high levels of self-esteem, innovative orientation, job satisfaction, and formal education (Allen, 1977; Keller & Holland, 1978, 1983; National Science Foundation, 1983; Pelz & Andrews, 1976). Therefore, project groups with members that have high levels of these variables may be expected to have high performance. Also, Fusfeld and Langlois (1982) noted that some project groups might excel because they have better access to needed technical equipment than others. Finally, Katz's (1982) model proposes that the type of R&D project groups perform can moderate the relationship between independent variables and performance on projects. For example, Katz found the correlations between longevity of group members and project performance

differed for research projects from those for development and technical service projects.

The purpose of the present research was to conduct a longitudinal, multivariate analysis of variables associated with the performance of project groups. This strategy was seen as an improvement over that of much of the prior research, which has used bivariate, cross-sectional designs. A set of hypotheses, based on the model developed by Katz (1982) and on the prior literature, was generated. It was hypothesized that physical propinquity among members of a project group, group cohesiveness, and the self-esteem, innovative orientation, job satisfaction, and educational level of group members would be positively related to a project group's performance. The mean tenure of members and a group's size were hypothesized to have curvilinear relationships with performance. A balance or equality between the influences of the project manager on administrative matters and the influence of the functional manager on technical aspects of a task was hypothesized to have a positive relationship with a project group's performance. Finally, type of R&D performed by a project group was hypothesized to moderate the relationships between the other independent variables and its performance.

METHODS

Participants

The R&D organization of a major American corporation, the site for this research, was selected because it used a matrix design with almost all professional employees assigned to single project groups and because it was geographically separate from other company facilities. A randomly selected sample representing half of the professional employees was invited to participate, and 221 professionals actually did participate in the research, a 90 percent response rate. These individuals belonged to 32 project groups across the organization's range of R&D activities. Managers and members of groups classified the projects according to type of R&D with very high agreement ($r = .77, p < .01$). Classifications were: basic research, 3 percent; applied research, 42 percent; new product or process development, 25 percent; technical service, 30 percent. The participants were highly educated; 60 percent held doctorates, with the area of highest degree about equally split between science and engineering. Ninety-two percent were men, and their average age was 43 years. Participants completed questionnaires at the R&D organization during normal business hours in groups of about 70 each, with only the researcher present.

Measures and Procedures

Group and individual variables were measured by both new and standard scales. Scales developed especially for this study appear in the Appendix. Group cohesiveness ($\alpha = .77$) was measured by Seashore's (1954) 5-item scale. Job satisfaction ($\alpha = .89$) was measured by the 20-item Minnesota Satisfaction Questionnaire (Weiss, Dawis, England, & Lofquist, 1967).

Rosenberg's (1965) 10-item scale was used to measure self-esteem ($\alpha = .86$). Innovative orientation ($\alpha = .90$) was measured by Kirton's (1976) 32-item Adaption-Innovation Inventory. High scores indicated an innovative orientation, or an ability to do things differently, and low scores indicated an adaptive orientation, or an ability to do things better. A 3-item scale developed especially for this research measured quality of technical and laboratory equipment ($\alpha = .76$). A factor analysis of these three items together with the four items regarding the influence of project and functional managers showed only one clear factor for quality of equipment with an eigenvalue greater than 1.0 before rotation. Project manager's influence on administrative matters ($\alpha = .68$) and functional manager's influence on technical aspects of a task ($\alpha = .63$) were each measured by a 2-item scale developed for this research. The factor analysis of these four items and those regarding quality of equipment revealed a two-factor solution for project and functional managers' influence. Physical distance (propinquity) to other members of a project group was measured by each participant's estimate of the distance in walking yards from the participant's primary work station to those of each of three other group members who were the most valuable sources of information for their project group's work. A factor analysis of only these three items showed only one clear factor with an eigenvalue greater than 1.0 before rotation, so these three scores were summed for each individual. Formal level of education was measured by a 1-item question, as were size of group, member's tenure on a project, and type of R&D work done in a project. Type of R&D work was coded as a 4-category ordinal scale for the correlational analysis because there is a logical progression from the upstream basic research projects, through applied research, to the downstream projects concerned with product development and technical service.

Criteria for project groups' performance were developed in conjunction with management to determine the critical dimensions that accounted for the success of project groups. Five criteria were identified that were also similar to the measures of project performance that the R&D organization used internally. These were technical quality, budget and cost performance, meeting an assigned schedule, value to the company, and overall group performance. The organization did not rate technical quality separately, including it in the rating for value to the company. After participants rated their project groups on these criteria, a factor analysis of only the five performance criteria revealed a two-factor solution. Technical quality, value to the company, and overall group performance formed one factor, called project quality ($\alpha = .78$), and the remaining two criteria made up the other factor, called budget/schedule performance ($\alpha = .71$). In addition, a panel of seven managers, who were familiar with the project groups they evaluated, rated groups on each of these criteria, once at the time of administration of the questionnaire, and again one year later. Three or four managers rated each project, each rating from 12 to 19 projects. At the time of the later ratings, two projects had ended, and 17 participants had left the organization; none of the project groups lost more than one individual, except for the terminated

projects, which lost two each. Scores for project quality and budget/schedule performance for the initial and one-year-later management ratings were also computed; interrater reliabilities for project quality were .75 and .78, and they were .70 and .71 for budget/schedule performance.

To justify aggregation to the project-group level, a one-way analysis of variance was performed on each of the independent and dependent variables to determine whether between-group differences were significant compared to within-group differences. In addition, a Bartlett-Box F was used to test for homogeneity of variance. All of the variables passed these tests, except for self-esteem and innovative orientation. However, as James (1982) noted, when the theory and hypotheses of a study require a certain level of analysis, as in the present instance, aggregation may be appropriate even without statistical justification. Hence, all variables were aggregated to group means because the project group was the unit of analysis.

RESULTS

Table 1 presents means, standard deviations, and a correlation matrix of the variables. Group cohesiveness was the only independent variable that significantly correlated with all four of the criteria for the performance of project groups. Physical distance, job satisfaction, and innovative orientation also correlated with at least one of the criteria. Members' mean project tenure and a group's size were both hypothesized to have curvilinear relationships with project performance. However, visual inspection of scatter diagrams for project tenure and group size with each of the four criteria of performance did not indicate any curvilinear relationships. In addition, a quadratic term for each of these two independent variables was added to the respective linear regression equations to determine the increment in R^2 for the quadratic term, the method to test for a significant curvilinear relationship that Cohen and Cohen (1983) recommended. None of these quadratic terms resulted in a significant increase in the R^2 s of the several performance criteria; hence, no curvilinear relationship between either project tenure or group size and project performance was inferred.

It was hypothesized that a balance between a project manager's influence on administrative matters and a functional manager's influence on technical aspects of a task would have a positive association with a project group's performance. To test this hypothesis, the projects first were ranked on their equality of scores between administrative influence from the project manager and technical influence from the functional manager. The projects were then ranked on each of the four criteria of project performance, and a Spearman rank correlation coefficient was calculated for each relationship between balance of influence and a performance criterion. None of these Spearman coefficients was significant; hence, no relationship between equal administrative and technical influence and project performance was inferred.

A series of multiple regression analyses was conducted to assess the relative influence of the independent variables on each of the criteria of project performance. Only the four independent variables that had a

TABLE 1
Descriptive Statistics and Correlation Matrix for All Variables^a

Variables	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Group cohesiveness	19.8	3.2																	
2. Group size	8.7	4.6	-29*																
3. Physical distance	172.9	63.4	-21	37*															
4. Member tenure	28.5	15.8	02	15	-17														
5. Type of R&D ^b	2.8	0.9	24	00	-26	04													
6. Quality of equipment	11.9	1.7	27	-06	01	24	-29*												
7. Administrative influence	7.2	1.9	10	38*	10	09	-29*	32*											
8. Technical influence	6.0	1.2	18	30*	07	22	-25	44**	47**										
9. Job satisfaction	76.7	10.4	35*	-16	-08	-04	19	-06	21	08									
10. Self-esteem	44.4	5.0	29*	14	41**	-10	30*	07	-07	-11	16								
11. Innovative orientation	100.1	14.8	06	11	07	-12	06	-05	24	-10	45**	35**							
12. Education ^c	5.3	1.1	-39**	14	37*	-29*	-31*	-08	-08	-31*	-34*	-11	18						
13. Project quality ^d	12.1	3.7	44**	-23	-33*	-06	-09	14	17	24	43**	12	33*	23					
14. Budget/schedule ^d	6.6	1.8	40**	-26	-29*	-16	-13	10	22	19	32*	16	26	20	37*				
15. Project quality ^e	12.3	3.1	47**	12	-11	24	-21	-01	10	11	21	11	36*	21	51**	32*			
16. Budget/schedule ^e	6.0	2.0	32*	05	-20	09	-20	-05	06	06	17	05	19	17	30*	42**	40**		
17. Project quality ^f	11.8	3.2	51**	20	-16	10	-17	12	00	18	25	06	44**	13	57**	30	66**	36*	
18. Budget/schedule ^f	6.1	1.8	36*	10	-14	01	-22	02	-03	-10	12	18	02	19	34*	48**	34*	59**	47**

^a N = 32; N = 30 for managers' performance ratings one year later. Decimals have been omitted.

^b Coded: basic research = 1, applied research = 2, new product/process development = 3, technical service = 4.

^c Coded: high school diploma = 1, some college = 2, bachelor degree = 3, some graduate training = 4, master's degree = 5, doctoral degree = 6.

^d Member responses.

^e Management responses.

^f Management responses one year later.

*p < .05

**p < .01

significant correlation with any of the performance criteria were included in the multiple regression analysis, because the number of groups (32) sampled was small, and adequate power for the tests of significance of the beta weights had to be maintained (Cohen & Cohen, 1983).

Table 2 reports the full-equation beta weights (standardized regression coefficients) for performance criteria as rated at the time of administration of the questionnaire. These data support the hypothesized association between group cohesiveness and each of the four criteria of performance. Job satisfaction, moreover, was associated with the two criteria rated by group members, but not with the two criteria rated by managers. Innovative orientation was related to both measures of project quality, but not to either measure of budget/schedule performance. Although physical distance had significant, negative, zero-order correlations with the two member-rated criteria, it was not significantly related to any of the performance criteria in the regression analyses.

A series of hierarchical multiple regression analyses was conducted to determine which of the four independent variables would account for unique variance in the criteria of project performance. Each variable was tested with two regression analyses, one including the variable and one excluding it. No predetermined order of entry of variables was specified. Table 2 reports the independent variables that accounted for significant increments to the R^2 s of the several criteria rated at the time of questionnaire administration. These results show that group cohesiveness was the only variable to account for unique variance for each of the four performance criteria. Innovative orientation, moreover, was the only other independent variable to add unique variance to a performance criterion (project quality as rated by members). Neither of the other two independent variables added significant variance to any of the performance criteria.

Table 3 reports beta weights and increments to R^2 for the managers' ratings of project groups' performance taken one year after questionnaire administration. Group cohesiveness was the best predictor of both project quality and budget/schedule performance over time. In addition, innovative orientation accounted for significant variance in predicting project quality.

The final hypothesis was that the type of R&D used in the project groups' work would moderate the relationships between other independent variables and the performance of groups. The four types of R&D were basic research, applied research, development of new products or processes, and technical service. For these analyses, basic and applied research projects were combined, as were product development and technical service projects, in order to provide adequate sample sizes; a dichotomously coded dummy variable for type of R&D resulted. A series of moderated regression analyses of the relationships between group cohesiveness and each of the performance criteria showed that an interaction term consisting of type of R&D and group cohesiveness did not add significant variance to any of the performance criteria, compared to an additive model of these two independent variables.

TABLE 2
Multiple Regression Analyses of Ratings of Project Groups' Performance
at Time of the Administration of Questionnaire^a

Variables	Project Quality (Members)			Budget/Schedule (Members)			Project Quality (Management)			Budget/Schedule (Management)		
	Beta Weights	Increments in R^2	F	Beta Weights	Increments in R^2	F	Beta Weights	Increments in R^2	F	Beta Weights	Increments in R^2	F
Group cohesiveness	.48**	.14	8.21**	.35*	.11	5.21*	.43**	.12	5.49*	.33*	.13	5.48*
Physical distance	-.18	.02	1.17	-.23	.02	0.95	-.12	.01	0.46	-.14	.01	0.42
Job satisfaction	.37*	.06	3.52	.32*	.05	2.37	.22	.04	1.83	.13	.02	0.84
Innovative orientation	.36*	.08	4.69*	.30*	.04	1.89	.32*	.09	4.11	.17	.02	0.91
Multiple adjusted R^2	.44			.37			.35			.31		
Overall F	5.48**			4.78**			4.55**			3.17*		

^a N=32; df = 1,27 for F tests of significant increment to R^2 .

*p < .05

**p < .01

TABLE 3
Multiple Regression Analyses of Managers' Ratings of Project Groups'
Performance One Year After Administration of Questionnaire^a

Variables	Project Quality			Budget/Schedule		
	Beta Weights	Increments in R ²	F	Beta Weights	Increments in R ²	F
Group cohesiveness	.49**	.14	7.53*	.34*	.13	5.60*
Physical distance	-.09	.00	0.17	-.06	-.01	0.84
Job satisfaction	.18	.04	1.90	.04	.00	0.26
Innovative orientation	.34*	.10	4.42*	.20	.03	2.17
Multiple adjusted R ²	.37			.29		
Overall F	5.50**			2.99*		

^a N=30; df = 1, 25 for F-tests of significant increment to R².

*p < .05

**p < .01

Hence, type of R&D did not moderate the relationship between group cohesiveness and the performance of project groups.

The moderated regression analysis for the interaction term consisting of type of R&D and innovative orientation did, however, add significant variance to the performance criterion of project quality as rated by members, compared to an additive model of the two independent variables ($F = 4.33, p < .05$). An inspection of the correlations between innovative orientation and project quality as rated by members within each type of R&D revealed a significant correlation for research projects ($r = .59, p < .05$), but a low correlation for product development and technical service projects ($r = .12, n.s.$). The difference between these two correlations approached significance ($p < .07$). Hence, some support emerged for the hypothesis that type of R&D moderates relationships between other independent variables and the performance of project groups.

DISCUSSION

The results of this study supported the hypotheses that group cohesiveness, innovative orientation, and job satisfaction would have positive relationships with project groups' performance. Correlations obtained suggested some support for the hypothesized negative relationship between physical distance and project performance as rated by members, but subsequent multiple regression analysis showed no support for this relationship.

Group cohesiveness was clearly the strongest predictor of project groups' performance across the four criteria, both at the initial assessment and over time. The findings suggest that cohesive project groups were able to achieve high project quality and meet their goals on budgets and schedules. It is also significant that the importance of group cohesiveness for project performance held up as a predictor across type of R&D, performance ratings both by group

members and management, and over time—substantial evidence of the robustness of cohesiveness as an independent variable in this study.

The results reported here suggest that the managers of R&D organizations that use project groups should encourage the development of cohesive groups. Short physical distances between members of groups, a supportive leadership style by project managers, and maintenance of stable group memberships over time all encourage cohesiveness. It should be noted that the present study had only one project that conducted basic research; hence, any normative implications for the management of project groups in basic research should be drawn with caution. In addition, it is possible that the relationship between cohesiveness and performance might have had a reverse causality, with high performance resulting in increased cohesiveness. Although the longitudinal data in this study suggest that cohesiveness affected performance, the reverse relationship, or perhaps more likely, a reciprocal relationship, cannot be ruled out with the data available. Future research should attempt to address this issue with a longitudinal, experimental design in a field setting.

The data indicate an innovative orientation was important for project quality, both as assessed at the time of the questionnaire and as a predictor over time, but it was not important for budget/schedule performance. These results are consistent with prior research on individuals by Keller and Holland (1978, 1983), which found that R&D professionals with innovative orientations produced more innovative outputs like patents and publications. The present results extend these findings to the project-group level of analysis. In addition, these results provide support for the logical proposition that innovative members enhance a project's quality, rather than its performance in terms of budget and schedule. The moderated regression analysis and subunit correlational analysis for members' ratings also suggest that innovative members help research projects rather than product development or technical service projects. This relationship appears reasonable, because research projects generally require more originality in thought than do downstream projects, which tend to require modification rather than originality.

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APPENDIX

Quality of technical and laboratory equipment was measured by the following three items, each using a 5-point response format ranging from very low to very high: quality of physical layout, quality of technical equipment, quality of laboratory technicians' services.

Project managers' influence on administrative matters and functional managers' influence on technical aspects of tasks were measured by the following four items, with the same response format as that in the above scale: project manager's influence on administrative matters, project manager's administrative ability, functional manager's influence on technical matters, functional manager's technical knowledge.

Physical distance from other members of a project group was measured by the following three items: Think of the three individuals in your group who are the most valuable sources of information for your work in the group. How far away are their primary work stations from yours? Most valuable source _____ walking yards, second most valuable source _____ walking yards, third most valuable source _____ walking yards.

Project groups' size, members' tenure, and type of R&D work were measured by the following 1-item scales: How many people of all classifications are assigned to this group: _____ people. How many months have you been assigned to this group: _____ months. Check the type of R&D work that best describes your project group work: basic or non-mission research; applied or mission-oriented research; new product or process development; technical service, or existing product or process improvement.

The performance of project groups was measured by the following five items, each using a 5-point response format ranging from very low to very high: technical quality, budget and cost performance, meeting the assigned schedule, value to _____ (company name), overall group performance.

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PARTICIPATION, SATISFACTION, AND PRODUCTIVITY: A META-ANALYTIC REVIEW

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This paper reports a meta-analytic literature review testing cognitive, affective, and contingency models of the effects of participation in decision making on employees' satisfaction and productivity. Contingency models received no support. Results from field studies provided some support for cognitive models, and strong support for affective models linking participative climate with worker satisfaction. Methodological variations such as research setting and type of participant were important moderators in subgroup analyses. We discuss the implications of such variations for task complexity.

I would not think of making a decision by going around the table and then deciding on the basis of how everyone felt. Of course, I like to hear everyone, but then I go off alone and decide. The decisions that are important must be made alone.

—Richard M. Nixon (Schecter, 1972:18-19)

Like Mr. Nixon, most people have strong feelings about the best way to make decisions. However, individuals often disagree about the proper decision making procedure. Should subordinates be included in decision making processes, or should managers stand alone as decision makers? Far from being limited to high national offices, the debate over the efficacy of participation in decision making exists throughout government, business, and many academic fields.

There are several reasons for the continuing disagreement on this topic. Moral reasoning regarding participation is often confounded with practical reasoning. Locke and Schweiger (1979) provided several examples of managers and academicians advocating the use of participation on moral grounds, regardless of whether or not it works. In addition, conflicting models of the mechanisms at work in the process of participation lead to confusion over the interpretation of research findings. Finally, in spite of the plethora of empirical research studies investigating participation, when reviewers of the literature draw conclusions on its effectiveness, they invariably still state

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that "it depends" (Locke & Schweiger; Lowin, 1968; Singer, 1974). Unfortunately, the question of what it depends on has never been clearly answered. To begin to answer this question, we carried out a meta-analytic review of past research on the effects of participation in decision making on satisfaction and productivity.

"ONE MORE LOOK" REVISITED

In recent years, several sets of scholars have done wide-ranging reviews of thinking and research on participation in the workplace. For example, Strauss (1982) took an international perspective on workers' participation, and Dachler and Wilpert (1978) looked at the dimensions and boundaries of the participation process. Perhaps the most comprehensive review of empirical research to date, however, is Locke and Schweiger's (1979) "one more look" at participation in decision making, which considered both moral and practical arguments for participation. They reviewed laboratory studies, correlational studies, multivariate field studies, and univariate field studies in which satisfaction and productivity were criterion variables. Locke and Schweiger concluded that little could be said about the effects of participation from multivariate field studies because too many other variables—differences in training, reward systems, education, and so forth—could account for effects often attributed to participation. They did, however, make generalizations based on correlational, laboratory, and univariate field studies.

Locke and Schweiger classified the conclusions of studies as "participation superior," "participation inferior," or "no difference or contextual" (1979: 317). Having found that the results in laboratory, correlational, and univariate field studies were remarkably consistent, they finally concluded: "(1) With respect to the productivity criterion, there is no trend in favor of participative leadership as compared to more directive styles; and (2) with respect to satisfaction, the results generally favor participative over directive methods, although nearly 40 percent of the studies did not find participation to be superior" (Locke & Schweiger, 1979: 316).

Although Locke and Schweiger's review considered well over 50 empirical research reports on participation, their final conclusions seem somewhat anticlimatic—probably for several reasons. First, they used a very gross classification system in considering effects of participation. The categories of superior, inferior, and contextual, though certainly useful, tell us nothing about the strength of participation's effects on satisfaction and productivity. Second, many studies fell into the contextual category, 56 percent for the productivity criterion and 30 percent for the satisfaction criterion. They suggested a number of contextual factors to account for the effectiveness of participation, including two individual factors, knowledge and motivation, and several organizational factors, such as task attributes, group characteristics, and leaders' attributes, but did not go back to the studies reviewed to systematically sort out these contextual effects. Finally, no attempt was made to consider systematic patterns differentiating the studies concluding that

participation was superior from those concluding that participation was inferior.

Meta-analysis (Hunter, Schmidt, & Jackson, 1982) can be employed to refine and extend Locke and Schweiger's findings. This method of cumulating results over studies allowed us to summarize numerically the effects of participation on satisfaction and productivity and to take into account artifactual and substantive sources of variance in the individual estimates of effects. Meta-analysis is an improvement over the review methods used by Locke and Schweiger on several counts. It considers the strength of effects between two variables rather than simply counting significant results or levels of probability, thus providing a more accurate representation of cumulated relationships between variables and eliminating the problem of giving a study with a strong effect the same consideration as one with a barely significant effect. Meta-analysis also provides methods for correcting for such systematic, artifactual sources of variance in the estimates of effects as measurement error and restriction in range. Finally, meta-analysis allows for the consideration of both substantive and methodological moderator variables that could account for unexplained variance in estimates of effects.

In a review considering the effect of research setting on results of studies of participation, Schweiger and Leana (1985) rejected the use of meta-analysis because of lack of consistency in the reporting of means, standard deviations, and correlations among these studies. This concern is important, especially if lack of reported statistics might lead to systematic biases in a review. However, the meta-analytic techniques used in this analysis only require estimates of sizes of effects, not means and standard deviations. The reporting of effect sizes—correlations and values for η and t —has been much more frequent in the literature on participation than reporting of means and standard deviations. Thus, we decided that a meta-analysis of this literature would be useful in resolving several of the problems of earlier reviews. In the next section, we discuss the relationships of participation with satisfaction and productivity through the presentation of cognitive, affective, and contingency models of participation. Meta-analysis does not allow for direct tests of these models, but the models enable identification of substantive and methodological variables that could moderate the relationships of participation with satisfaction and productivity.

PARTICIPATION, SATISFACTION, AND PRODUCTIVITY

Theorists have advanced a variety of models to account for participation's influence on satisfaction and productivity; each proposes mechanisms through which participation has its effects. We used three types of models—cognitive, affective, and contingency—to highlight differences in these propositions. Each of the three types emphasizes a different explanatory mechanism. The three are not mutually exclusive, however, as many theorists have proposed that cognitive, affective, and contingency variables all play important roles in the participative process.

Cognitive Models of Participative Effects

Cognitive models of participative effects suggest that participation in decision making is a viable strategy because it enhances the flow and use of important information in organizations. Theorists supporting such models (Anthony, 1978; Frost, Wakely, & Ruh, 1974) propose that workers typically have more complete knowledge of their work than management; hence, if workers participate in decision making, decisions will be made with better pools of information. In addition, cognitive models suggest that if employees participate in decision making, they will know more about implementing work procedures after decisions have been made (Maier, 1963; Melcher, 1976). Other scholars (Miles & Ritchie, 1971; Ritchie & Miles, 1970), designating cognitive models as the "human resources" theory of participation, note that such a model is "primarily concerned with the meaningful utilization of subordinates' capabilities and views satisfaction as a by-product of their participation in important organizational decisions" (Ritchie & Miles, 1970: 348).

Cognitive models predict a definite pattern of results in empirical research investigating participation, satisfaction, and productivity. First, because these models consider information to be crucial, increases in productivity are expected to be stronger where workers have good information about decisions to be made. For instance, such models would predict a stronger effect for participation in job design than for participation in company-wide policy decisions or experimental discussions. Second, such models do not predict immediate increases in satisfaction as a result of participation in decision making, as it is essentially a knowledge of results that is hypothesized to lead to eventual increases in satisfaction. Third, they do not predict increases in workers' productivity and satisfaction simply from their working in participative work climates or for nondirective leaders. According to cognitive models, increases in productivity and satisfaction are attributable to specific inputs from subordinates on issues in which they are interested and knowledgeable.

Affective Models of Participative Effects

There are several models linking participation to productivity and satisfaction through affective mechanisms. Followers of the "human relations"¹ school of management (Blake & Mouton, 1964; Likert, 1967; McGregor, 1960) adamantly espouse these models, in which the most crucial link is that between participation and workers' satisfaction. These theorists propose that participation will lead to greater attainment of high-order needs, such as self-expression, respect, independence, and equality, which will in turn increase morale and satisfaction. Ritchie and Miles stated that "managers who hold the Human Relations theory of participation believe simply in involvement for the sake of involvement, arguing that as long as subordi-

¹ Ritchie and Miles (1970: 348) coined this term in regard to participation in decision making.

nates feel they are participating and are being consulted, their ego needs will be satisfied and they will be more cooperative" (1970: 348).

The link between participation and productivity in affective models is less straightforward than that between participation and satisfaction. Essentially, this school proposes that participation will enhance productivity through intervening motivational processes: participation fulfills needs, fulfilled needs lead to satisfaction, satisfaction strengthens motivation, and increased motivation improves workers' productivity. According to French, Israel, and As (1960):

One effect of a high degree of participation by workers in decisions concerning their own work will be to strengthen their motivation to carry out these decisions. This is the major rationale for expecting a relation between participation and production. When management accords the workers participation in any important decision, it implies that workers are intelligent, competent, and valued partners. Thus, participation directly affects such aspects of worker-management relations as the perception of being valued, the perception of common goals, and cooperation. It satisfies such important social needs as the need for recognition and appreciation and the need for independence. These satisfactions and in addition the improvements in their jobs that are introduced through participation lead to higher job satisfaction (1960: 5).

Although several theorists (Locke & Schweiger, 1979; Ritchie & Miles, 1970) feel strongly that scholarly and practical emphasis should be placed on the cognitive effects of participation, researchers in the tradition of McGregor (1960), Likert (1967), and Coch and French (1948) still hold strongly to the importance of participation in providing affective changes in workers. Thus, it is important to consider the predictions of affective models as to the effects of participation on satisfaction and productivity. First, they predict that participation will affect satisfaction in a wide variety of situations. Participation need not be centered on issues of which employees are particularly knowledgeable, for it is the act, not the informational content, of participation that is the crucial mechanism. Second, such models do not predict increases in productivity without initial increases in workers' satisfaction. Finally, affective models suggest that participation will more strongly influence lower-level employees, because managers' higher-order ego needs may well be fulfilled by other aspects of their work.

Contingency Models of Participative Effects

Several theorists suggest that it is not possible to develop models of participative effects that will hold across a wide variety of individuals and situations. Rather, they suggest that participation will affect satisfaction and productivity differently for different people and situations. Scholars have offered a variety of contingency theories centering on personality, particular decision situations, relationships between superiors and subordinates, job levels, and values.

Vroom (1960) was the first to propose that personality might mediate the effects of participation on satisfaction and productivity. Specifically, he suggested that participation will positively influence only employees having personalities with low authoritarianism and high needs for independence. Vroom found some support for his hypotheses, and his work has stimulated other research. However, further studies have provided mixed support for his hypotheses (Abdel-Halim, 1983; Tosi, 1970; Vroom & Mann, 1960).

Vroom was also involved in the major theoretical statement of situational influences on the participation process. Vroom and Yetton (1973), building on the work of Tannenbaum and Schmidt (1958), considered different decision situations and provided rules for deciding the optimal level of participation in decision making. They proposed both rules to protect the quality of decisions and rules to protect their acceptance. Most of the research on this model has been descriptive, drawing on self-reports about how managers behave in different decision situations. However, several normative tests (Vroom & Jago, 1978) have indicated that decisions made within participative modes specified by these rules were more effective than other decisions. Vroom and Yetton's work moves toward an integration of cognitive and affective models of participation. Their contingency rules for protecting the quality of decisions deal with the cognitive portion of participation, and their rules for protecting the acceptance of decisions address its affective components.

Several other theorists have proposed additional variables as intervening in the process of participation. For example, Vroom and Deci (1960) suggested that the types of problems dealt with at various organizational levels influence the appropriateness of participation; it may be less appropriate at low levels, where jobs are routine, and more appropriate at high levels, where jobs involve addressing complex problems. Several scholars (Hulin, 1971; Singer, 1974) have suggested that values mediate the relationship between participation and outcomes, specifically, that many workers may not value participation to the extent that academicians do. Singer further commented, "While the necessity for determining a 'one best' leadership style for the 'composite worker' is understandable from a financial and expediency standpoint, to assume that *all* workers desire participation opportunities is to lack sensitivity to *individual* needs—the antithesis of the humanization that ardent proponents of participation advocate" (1974: 359). Thus, these scholars predicted that participation may only be effective for employees in certain types of organizations—such as research or service organizations, rather than manufacturing organizations—or only for middle- or upper-level employees.

Overview

In sum, cognitive models of participation propose that participation leads to increases in productivity through bringing high-quality information to decisions and through increasing knowledge at times of implementation. Such models predict that: (1) The effects of participation on an individual's

productivity will be the strongest for decisions that draw on the individual's expertise. (2) There will not be a direct influence of participation on job satisfaction. Rather, the effect of participation on productivity will mediate this effect. (3) Participation in specific decisions is necessary for increases in productivity and satisfaction; working in a participative climate is not adequate.

Affective models suggest that participation will satisfy higher-order needs of workers and that, as these needs are satisfied, workers will be more satisfied with their jobs. Such models predict that: (1) Working in a participative climate is adequate for increasing workers' productivity. It is not necessary that workers participate in decisions on which they have special knowledge. (2) There is no direct link between participation and productivity. Rather, improved attitudes reduce resistance to change and increase motivation through the satisfaction of needs. (3) Participation may provide more noticeable increases in satisfaction for employees who are not having higher-order needs fulfilled from other aspects of their jobs.

Contingency models of participation suggest that no single model of participation is appropriate for all employees in all organizations. Instead, various contingency models predict that: (1) Employees with high needs for independence and personalities with low authoritarianism will be the most positively influenced by participation. (2) Some decisions are more appropriate for participation than others. Appropriateness depends on requirements for the quality or acceptance of a decision (Vroom & Yetton, 1973), or on its complexity. (3) Employees who value participation will be the most positively influenced by it, and these are likely to be higher-level employees, or individuals working in research or service industries.

Methodological Moderators

In addition to the substantive moderators suggested by the cognitive, affective, and contingency models, several methodological moderators might explain variance in findings about the relationships between participation and satisfaction and productivity. According to Schweiger and Leana, "One potential contextual factor that has not been adequately addressed in previous reviews of the PDM [participation in decision making] literature concerns the research environment in which participation has been examined. Just as PDM may be effective for some subordinates and not for others, consistent findings concerning the effects of PDM may depend, at least in part, on the research setting in which PDM is being investigated" (1985: 148). These authors compared studies conducted in laboratory settings with those conducted in field settings. Locke and Schweiger (1979) considered laboratory, correlational, multivariate, and univariate field studies. Neither of these reviews found that research settings moderated the effect of participation on satisfaction and productivity. Schweiger and Leana concluded that "the laboratory is capable of producing findings that are generalizable to the field" (1985: 18). However, both of these reviews used counting or narrative

techniques to assess the differences among research reports. It is quite possible that the more stringent requirements of meta-analysis could reveal effects for research setting that were not apparent in these reviews.

Measurement is a second methodological variable that might moderate findings about participative effects. There are many conceptualizations of participation, ranging from delegation, through representative systems, to joint decision making by superiors and subordinates. Following Locke and Schweiger (1979), we defined participation as joint decision making, a definition that does not specify the precise form or content of the participative process, but does exclude delegation. However, this conceptual definition embraces a wide range of operational definitions of participation. Similarly, the concepts of satisfaction and productivity take on many meanings in different research efforts. It is quite possible that this wide range of conceptual and operational definitions has resulted in varying strengths of relationships between participation and satisfaction and productivity.

METHODS

Our literature search for relevant research on the effects of participation on satisfaction and productivity included journals in the areas of social psychology, management, organizational behavior, and communication, and several relevant social citation indices. We restricted it to the published literature and to English language journals and books, excluding dissertations and other unpublished research. It is possible that this led us to include more studies with significant results and fewer with nonsignificant results. However, Hunter, Schmidt, and Jackson (1982) did not see this as a serious problem, noting that it is likely that nonsignificant dissertation results may well be attenuated owing to methodological problems. They further stated that, typically, only a very large number of lost studies will make a substantive difference in a meta-analysis.

This literature search identified 106 articles and book chapters on participation. However, many of these were not appropriate for meta-analysis. We eliminated literature reviews and essays that were not based on data (12 articles), 13 data-based articles without quantifiable effect sizes, 5 studies in which participation was the dependent variable, 6 studies whose dependent variables were not appropriate for this meta-analysis, 15 studies lacking clear measures of participation, and 7 studies in which methodological problems² posed serious questions about an estimation of effects or whose

² The category of methodological problems included a number of studies in which confounding variables or unusual methods made accurate estimation of effects impossible. For instance, the overtime study of Lawler and Hackman (1969) included an outlying data point that made interpretation difficult. In addition, the nonparticipative group in this study had much lower attendance than the participative group to begin with, limiting our confidence in the results. A second example of a methodological problem is Ivancevich's (1976) investigation of goal setting in which both participative and assigned groups went through extensive and active training sessions. In all ways except the actual goal setting, both groups had high levels of participation.

data came from another study included in the meta-analysis. Table 1 lists the studies excluded from this meta-analysis, years of publication, sources, and reasons for exclusion.

Several classic organizational studies were eliminated because of confounding variables or methodological problems. For example, results of the Hawthorne studies (Roethlisberger & Dickson, 1939) have often been attributed to increased participation and interaction. However, several commentaries (Carey, 1967; Lawler, 1975) have provided strong evidence that those reported effects can be more reasonably attributed to rest pauses, reduced work hours, and personnel replacements. Coch and French (1948), the classic study that stimulated interest and research in participation, is also plagued by methodological problems. Bartlem and Locke (1981) pointed out that the increases in productivity and morale in the Coch and French study should probably be attributed to improved training techniques rather than participation. Also, the extraordinarily small within-group variance in this study, possibly the result of group conformity, made the effect size computed from it misleading. Finally, we did not use the productivity estimate in the often-cited Morse and Reimer (1956) field study because the only way productivity could be increased was through the elimination of employees. Not surprisingly, the participative group was unwilling to do this, and productivity increases were much higher in the hierarchical division of the company.

From this process of literature search and elimination, we found 47 studies that contained quantifiable estimates of the relationship between participation in decision making and satisfaction or productivity. Of these, 9 studies were experimental or quasi-experimental studies with subjects who were not organizational members, 13 were field experiments in which participation was manipulated in an organization, and the rest were correlational. Many studies contained estimates of the effect of participation on both satisfaction and productivity, and several included more than one estimate from multiple samples. In total, 41 estimates of the effect of participation on satisfaction and 25 estimates of the effect of participation on productivity were available. Tables 2 and 3 list the studies included in the analysis, years of publication, sample sizes, and estimates of effect sizes.

Meta-analysis involves the computation of the size of effects between the variables of interest for each study. After individual effect sizes are computed, they are cumulated for an estimate of the effect over a large number of studies. This estimate can be corrected for statistical sources of variance, and the variance due to hypothesized moderating variables can be estimated.

The first step in this analysis was the computation of an effect size for each study. Two estimates were available: d , recommended by Glass, McGaw, and Smith (1981); and r , recommended by Hunter and colleagues (1982). These statistics are direct transformations of each other, but we chose r because it provides several advantages: (1) the correlation coefficient has a well-known finite metric ranging from -1.00 to $+1.00$; (2) it is used in related

TABLE 1
Studies Excluded from the Meta-Analysis Organized
by the Seven Reasons for Exclusion

Articles	Journals
Reviews and essays excluded	
Dachler & Wilpert (1978)	Administrative Science Quarterly
Derber (1963)	Industrial Relations
Keeley (1984)	Administrative Science Quarterly
Lammers (1967)	American Sociological Review
Locke & Schweiger (1979)	Research in Organizational Behavior
Lowin (1968)	Organizational Behavior & Human Performance
Melcher (1976)	Human Resource Management
Mulder (1971)	Administrative Science Quarterly
Rosenfeld & Smith (1967)	Personnel Journal
Singer (1974)	Sociology of Work & Occupations
Strauss (1982)	Research in Organizational Behavior
Wood (1973)	Psychological Bulletin
No quantifiable effect size available	
Carroll & Tosi (1970)	Administrative Science Quarterly
Chaney & Teel (1972)	Personnel
Dill, Hoffman, Leavitt, & O'Mara (1961)	California Management Review
Fleishman (1965)	Personnel Psychology
Ivancevich (1979)	Academy of Management Journal
Latham & Yukl (1975)	Journal of Applied Psychology
McCurdy & Eber (1953)	Journal of Personality
Miles & Ritchie (1971)	California Management Review
Powell & Schlacter (1971)	Academy of Management Journal
Schuler (1977)	Academy of Management Journal
Stagner (1969)	Journal of Applied Psychology
Vroom & Jago (1978)	Journal of Applied Psychology
Vroom & Yetton (1973)	Leadership & Decision Making
Participation as dependent variable	
Alutto & Belasco (1972)	Administrative Science Quarterly
Dickson (1980)	Journal of Applied Psychology
Heller & Yukl (1969)	Organizational Behavior & Human Performance
Long (1979)	Academy of Management Journal
Tannenbaum & Schmidt (1958)	Human Behavior Research
Productivity or satisfaction not dependent variable	
Hrebiniak (1974)	Academy of Management Journal
Maier (1953)	Human Relations
Mitchell (1973)	Academy of Management Journal
Ruh, White, & Wood (1975)	Academy of Management Journal
Searfoss & Monczka (1973)	Academy of Management Journal
Siegel & Ruh (1973)	Organizational Behavior & Human Performance
Participation not clearly measured/manipulated	
Argyle, Gardner, & Cioffi (1958)	Human Relations
Calvin, Hoffman, & Harden (1957)	Journal of Social Psychology
Foa (1957)	Personnel Psychology
Hoffman, Harburg, & Maier (1962)	Journal of Abnormal and Social Psychology
Levine & Butler (1952)	Journal of Applied Psychology

TABLE 1 (continued)
Studies Excluded from the Meta-Analysis Organized
by the Seven Reasons for Exclusion

Articles	Journals
Participation not clearly measured/manipulated (continued)	
Mahoney (1967)	<i>Management Science</i>
Maier & Sashkin (1971)	<i>Personnel Psychology</i>
Miner (1979)	<i>Academy of Management Journal</i>
Mulder (1959)	<i>Acta Psychologica</i>
Mullen (1965)	<i>Academy of Management Journal</i>
Oldham (1976)	<i>Organizational and Human Performance</i>
Pelz (1956)	<i>Administrative Science Quarterly</i>
Sadler (1970)	<i>Journal of Applied Behavioral Science</i>
Shaw & Blum (1966)	<i>Journal of Personality and Social Psychology</i>
Weschler, Kahane, & Tannenbaum (1952)	<i>Occupational Psychology</i>
Methodological problems	
Bragg & Andrew (1973)	<i>Journal of Applied Behavioral Science</i>
Coch & French (1948)	<i>Human Relations</i>
Ivancevich (1976)	<i>Journal of Applied Psychology</i>
Kidd & Christy (1961)	<i>Journal of Applied Psychology</i>
Lawler & Hackman (1969)	<i>Journal of Applied Psychology</i>
Roethlisberger & Dickson (1939)	<i>Management and the Worker</i>
Schefflen, Lawler, & Hackman (1971)	<i>Journal of Applied Psychology</i>
Data included through other study	
Baumgartel (1957)	<i>Administrative Science Quarterly</i>

analyses like path analysis and multiple regression; and (3) it permits the identification of variance due to statistical artifacts such as sampling error, measurement error, and restriction in range. After r was computed for each study, the coefficient was corrected for measurement error, if estimates of reliability were available. Unfortunately, less than half the studies under consideration included such estimates. Further, no studies included information that would allow for correction for restriction in range. Thus, the correlation coefficients were cumulated after correcting only for attenuation due to measurement error.

Separate analyses were performed for each dependent variable. We cumulated effect sizes and computed a weighted-average effect size. We then computed the variance in that estimate and subtracted variance expected from sampling error from the actual variance. This resulted in an estimate of true variance in the correlation coefficients. If the true variance estimate was larger than 0, statistically testable through chi-square, we considered moderating variables. The procedure above was repeated until it became clear that all possible variance had been accounted for.

A variety of moderating variables were considered for subgroup analysis. These were: (1) the types of jobs held by a study's participants—managers,

TABLE 2
Summary Statistics for Studies, Satisfaction as Dependent Variable

Subgroups ^a	N	r	σ^2_r	σ^2_e	σ^2_p	χ^2
Nonorganizational	328	+.3787	.0041	.0134	.0000	0.00
Fox (1957)	72	.46				
Gibb (1951)	20	.50				
Katzell et al. (1970)	76	.37				
Shaw (1955)	48	.36				
Veen (1972)	40	.37				
Wexley et al. (1973)	72	.29				
Actual participation	1,691	+.1561	.0083	.0047	.0035	8.19
French et al. (1960)	33	.05				
Ivancevich (1977)	107	-.11				
Latham & Yukl (1976)	41	.02				
Lischeron & Wall (1975)	237	.01				
Morse & Reimer (1956)	201	.22				
Obradovic (1970, 1st estimate)	200	.29				
Obradovic (1970, 2nd estimate)	195	.19				
Obradovic (1970, 3rd estimate)	142	.12				
Obradovic et al. (1970)	520	.20				
Seeborg (1978)	15	.11				
Specific issue	787	+.2119	.0067	.0058	.0009	0.78
Alutto & Acito (1974)	75	.27				
Alutto & Vrendenburgh (1977)	197	.15				
Jenkins & Lawler (1981)	58	.34				
Lischeron & Wall (1974)	127	.35				
Ritchie & Miles (1970)	330	.16				
Multiple issue	3,532	+.4617	.0191	.0035	.0156	88.50
Abdel-Halim (1983)	229	.43				
Abdel-Halim & Rowland (1976)	106	.32				
Baumgartel (1956)	180	.17				
Falcione (1974)	145	.23				
Fiman (1973)	170	.32				
House & Dessler (1974, 1st estimate)	82	.40				
House & Dressler (1974, 2nd estimate)	69	.53				
Mitchell et al. (1975)	131	.62				
Roberts et al. (1968)	6	.47				
Runyon (1973)	54	.36				
Schuler (1976)	353	.36				
Schuler (1980, 1st estimate)	382	.55				
Schuler (1980, 2nd estimate)	429	.50				
Schuler & Kim (1978)	409	.55				
Tosi (1970)	488	.64				
Vroom (1960)	108	.52				
Vroom & Mann (1960, 1st estimate)	28	.54				
Vroom & Mann (1960, 2nd estimate)	24	.31				
Yukl & Kanuk (1979, 1st estimate)	98	.31				
Yukl & Kanuk (1979, 2nd estimate)	41	.12				

^a See the tree diagram in Figure 1 for the successive partition of all studies into the subgroups listed in this table.

TABLE 3
Summary Statistics for Studies, Productivity as Dependent Variable

Subgroups ^a	N	r	σ^2_r	σ^2_e	σ^2_p	χ^2
Goal setting	376	+.1130	.0154	.0181	.0000	0.00
Dossett et al. (1979, 1st estimate)	40	-.07				
Dossett et al. (1979, 2nd estimate)	28	.24				
Ivancevich (1977)	113	.24				
Latham et al. (1978)	76	.11				
Latham & Marshall (1982)	38	.10				
Latham & Saari (1979)	40	-.12				
Latham & Yukl (1976)	41	.10				
Field setting	1,193	+.2727	.0044	.0072	.0000	0.00
Abdel-Halim (1983)	229	.29				
Abdel-Halim & Rowland (1976)	106	.28				
Fiman (1973)	170	.12				
Jenkins & Lawler (1981)	58	.28				
Neider (1980)	67	.30				
Roberts et al. (1968)	6	.47				
Schuler & Kim (1978)	383	.31				
Veen (1972)	40	.33				
Vroom (1960)	108	.26				
Yukl & Kanuk (1979)	26	.37				
Authoritarian vs. participative leadership manipulation	209	-.3333	.0292	.0151	.0141	3.73
Ivancevich (1974)	64	-.54				
Katzell et al. (1970)	76	-.21				
McCurdy & Lambert (1952)	21	-.02				
Shaw (1955)	48	-.39				
Assigned vs. participative group manipulation	204	-.0114	.0025	.0196	.0000	0.00
French et al. (1960)	92	.01				
Lanzetta & Roby (1960)	18	.10				
Latham & Steele (1983)	72	-.07				
Torrance (1953)	22	.00				

^a See the tree diagram in Figure 2 for the successive partition of all studies into the subgroups listed in this table.

production workers, professionals, clerical and technical workers, or mixed groups; (2) the type of organization in a study—manufacturing, service, utility, drug, engineering, research, or military; (3) the object of participation—general participation, appraisal interviews, job redesign, goals, training tasks, financial decisions, or experimental tasks; (4) the study design involved—laboratory experiment, field experiment, or correlational study; (5) the manipulation or measurement of participation—leadership style, type of group tasks, leadership behavior, general participation, decisional deprivation, actual participation, representative participation, or observational coding; (6) the type of satisfaction measured—overall satisfaction, work satisfaction, attitude toward job, satisfaction with supervision, intrinsic satisfaction, attitude toward experimental task—and whether a well-known scale such as the Job Descriptive

Index (JDI) (Smith, Kendall, & Hulin, 1969) or an instrument designed specifically for an individual study was used; (7) the measurement of productivity—time scores, error scores, costs, sales, managers' performance ratings, unit production per time, or perceived productivity.

RESULTS

Satisfaction

Forty-one estimates of the relationship between participation and satisfaction were considered. After cumulation of estimates of effects, the weighted mean correlation was .34, and the true variance was .0301. A chi-square test showed this variance to be statistically different from 0 ($\chi^2 = 244.27$, $df = 40$, $p < .01$), indicating that moderator variables would reduce the variance in estimates. We first looked at substantive moderators like organizational type, job level, and type of decision. None of these subgroupings proved useful in reducing variance or in differentiating among effect sizes. Hence, we considered methodological moderators.

The first moderator variable that was effective in reducing subgroup variance was type of respondent. We divided the studies into those conducted with nonorganizational participants (students) and those conducted with organizational respondents. The mean weighted correlation for the nonorganizational studies was .38; the true variance among these estimates was negative, hence considered to be 0. The variance in the organizational studies was still significant, so we considered additional moderators.

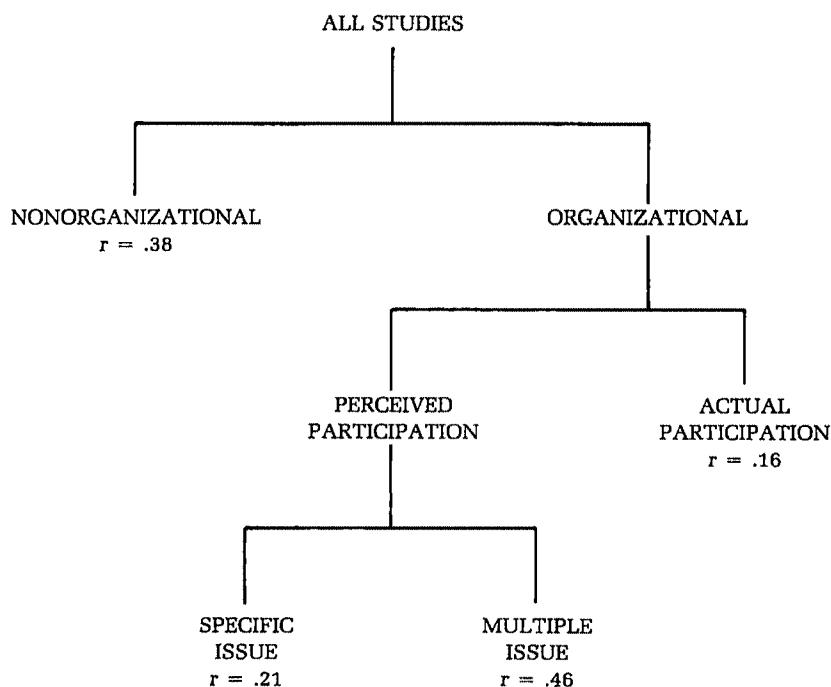
The organizational studies were divided into those that measured actual participation and those that measured perceived participation. The mean weighted correlation for studies of actual participation was .16; the variance among these estimates was .0035, which is not significantly different from 0 ($\chi^2 = 8.19$, $df = 10$, $p > .05$). However, the variance in studies investigating perceived participation was still significant. We considered one additional moderator to eliminate the remaining variance: whether perceived participation was in reference to specific issues, such as goals, pay plans, or job redesign, or in reference to multiple issues or a general participative climate, evaluated by a question like "In general, how much do you participate in decision making on your job?" The mean weighted correlation for studies concerned with specific issues was .21; the variance among these estimates was .0009. This variance was not significant ($\chi^2 = .78$, $df = 4$, $p > .05$). The mean weighted correlation for studies concerned with multiple issues was .46. The variance among these effect size estimates was .0156. This variance is still significant ($\chi^2 = 88.5$, $df = 19$, $p < .01$). Several other variables (measurement, job level, and organizational type) were considered for further reducing the variance among effect sizes. However, no other moderator variables reduced the variance within subgroups, so the analysis of studies in which satisfaction was the dependent variable ended at this point.

Table 2 presents information regarding the satisfaction subgroups in which variance was reduced to the greatest extent possible. These groups

include (1) nonorganizational studies, (2) studies of actual participation, (3) studies of perceived participation in relation to specific issues, and (4) studies of perceived participation in relation to multiple issues. The table provides the studies included in each subgroup, the mean weighted correlations, the observed variance among estimates of effect sizes, the variance among estimates expected from sampling error, the true variance among estimates, and the chi-square value testing whether the variance is statistically different from 0. Figure 1 is a tree diagram of analyses performed with satisfaction as the dependent variable.

All of the subgroup estimates for satisfaction differ significantly from 0, but there is substantial variation in the magnitudes of effects. The strongest effects of participation on satisfaction are found in studies of perceived participation focusing on multiple issues and in the nonorganizational studies. Much smaller effects are found in the studies of perceived participation focusing on single issues and in the studies of actual participation. In three out of four subgroups, the variance has been reduced to what would be expected from sampling error. Because of the reduction in variance and the sharp differences among subgroups in sizes of effects, it appears that the

FIGURE 1
Tree Diagram of Studies in the Meta-Analysis
for Satisfaction as Dependent Variable



analyses were successful in partitioning the studies into appropriate subgroups.

Productivity

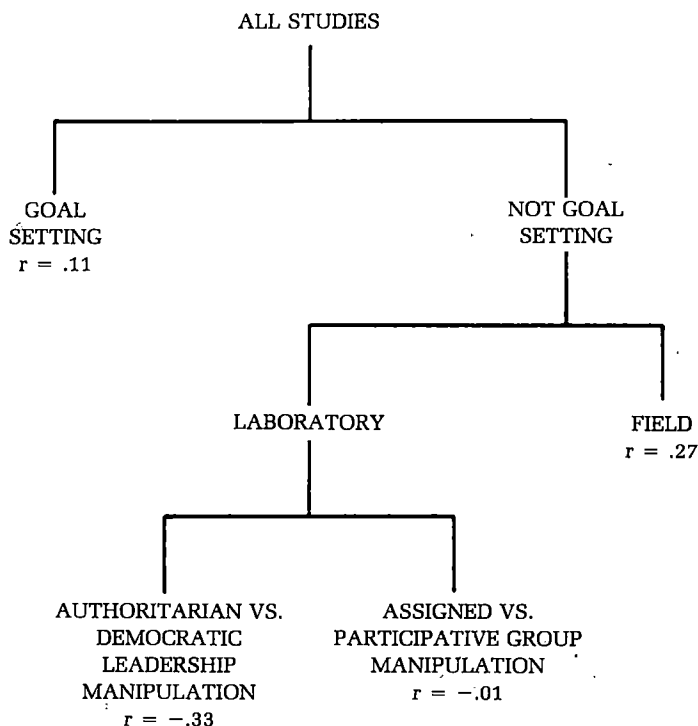
Twenty-five studies containing estimates of the relationship between participation and productivity were analyzed. After cumulation of effect estimates, the weighted mean correlation was .15, and the true variance was .0334. A chi-square test showed this variance differed significantly from 0 ($\chi^2 = 69.47$, $df = 25$, $p < .01$), so we considered moderator variables. Again, substantive moderator variables were considered first. Of these variables, the objects of participation proved to be useful for subgroup analysis. Seven studies investigated the effects of participation in goal setting on productivity. The cumulated mean weighted correlation for studies of goal setting was .11, and the variance among these estimates was 0. However, the variance among other studies was still significant, so we sought additional moderators. Because other substantive moderators did not prove useful, we evaluated methodological moderators. The first methodological moderator used was research setting. The mean weighted correlation for the nine field studies was .27; the variance among these estimates was 0. Hence, no further analyses were necessary on this subgroup. The variance among estimates for the laboratory studies was significant, so we analyzed these further.

The final moderator considered for studies in which productivity was the dependent variable was the manipulation used in the laboratory studies. Four of the studies manipulated leadership style; a research assistant or member of the experimental group had been instructed to be leader and to behave in an authoritarian or democratic style. The correlation between participation and productivity in the studies manipulating leadership style was $-.33$; the variance among these estimates was .014. This variance was not significant ($\chi^2 = 3.73$, $df = 3$, $p > .05$). The other four studies manipulated the nature of the tasks the groups performed, by placing subjects in assigned or participative task groups. The correlation between participation and productivity in these studies was $-.01$; the variance among the estimates was 0.

Table 3 presents information regarding the subgroups of studies investigating productivity in which variance was reduced to the greatest extent possible. These groups are (1) studies concerned with participation in goal setting, (2) field studies, (3) laboratory studies in which leadership style was manipulated, and (4) laboratory studies in which the nature of a task was manipulated. The table provides the studies in each subgroup, the mean weighted correlations, the observed variance among estimates of effect sizes, the variance among estimates expected from sampling error, the true variance among estimates, and the chi-square value testing whether the variance differs statistically from 0. Figure 2 is a tree diagram of subgroup analyses performed with productivity as the dependent variable.

As with the satisfaction studies, the mean weighted correlations of the different subgroups differ substantially. The laboratory studies that manipulated the nature of a task show essentially no correlation, and the studies

FIGURE 2
Tree Diagram of Studies in the Meta-Analysis
for Productivity as Dependent Variable



concerned with goal setting exhibit a significant, but small, positive correlation. The field studies show a relatively strong positive correlation, and the studies of leadership style exhibit a relatively strong negative correlation. The variance among estimates in these subgroups has been reduced to that attributable to sampling error. The substantially different effect sizes and the reduction in subgroup variance suggest that our partitioning efforts were appropriate and successful.

DISCUSSION

Contingency Models of Participation

This meta-analysis provided no support for any of the contingency predictions discussed. We considered both job type and organizational type as possible moderator variables at all stages of analysis, but there was no reduction of variance in effect sizes through subgroupings on the basis of these variables. Thus, it does not appear that participation is more effective

for managers than for lower-level employees, or vice versa. There is also no evidence that research, service, and manufacturing organizations differ in terms of the effectiveness of participation. It was not possible to provide a test of contingency predictions referring to personality, because very few studies provided subgroup analyses considering individuals with different personality types. As mentioned earlier, studies that have considered authoritarianism and need for independence have provided conflicting conclusions.

Finally, it should be noted that the variance in studies of participation in goal setting was reduced to that accountable to sampling error. The correlation between participation in goal setting and productivity was significant, but small ($r = .11$). This result should come as little surprise to those researching goal setting, most of whom have now concluded (e.g., Latham & Marshall, 1982; Latham & Steele, 1983) that participation may have an effect on the levels of goals set, but that it has no effect on productivity if the levels of goals stay the same. Cumulating these results over a variety of research settings adds credence to the generalizability of this conclusion.

Cognitive Versus Affective Models of Participation

This meta-analysis provided several tests of the efficacy of cognitive and affective models of participation. First, the findings can be considered in terms of contrasting the effects of participation on satisfaction with the effects of participation on productivity. Affective models predict that participation will have a stronger effect on satisfaction than on productivity, and cognitive models predict the opposite. Second, cognitive models predict that participation will have a stronger influence on productivity and satisfaction for decisions about which employees have specific knowledge. In contrast, affective models predict that working in a participative climate will have the most beneficial effects on workers' attitudes and productivity.

The studies investigating effects of participation other than goal setting on productivity exhibited a stronger influence of participation ($r = .27$) than the studies of satisfaction investigating actual participation ($r = .16$) or perceived participation for a single variable ($r = .21$). Of course, comparisons of these effects for different dependent variables should be made with caution, and the differences here are not substantial. However, even the fact that there is a moderately strong effect size for field studies investigating the influence of participation on productivity indicates that cognitive models have some plausibility. Further, the relatively low, but significant, correlations between actual participation and satisfaction and between participation and satisfaction in studies of single issues might lessen confidence in affective models of participation.

However, the data seem more consistent with an affective explanation when we consider studies of participation involving multiple issues. These studies investigated perceived participation and typically used such items as "In general, how participative is your workplace?" or "How much do you generally share in decision making with your supervisor?" After subgroup analysis, some unexplained variance remained in this subgroup, but the

mean weighted effect size was .46, much larger than the average correlations in other subgroups of field studies. It appears that working in a participative climate is strongly related to satisfaction at work. This result is in keeping with the human relations school of organizational behavior and with current interest in work climates. In particular, it supports the idea that microclimates (Schneider, 1981), such as a climate for variety, a climate for innovation, or a climate for participation, are related to individual attitudes. However, it is important to consider the structure of this relationship. Does a participative climate cause workers' satisfaction? Does workers' satisfaction help develop a participative climate? Or are these two variables redundant indicators of the same concept? LaFollette and Sims (1975), discussing Johannesson (1973), summarized this dilemma well:

If it appears as if perceptual climate research is converging upon any domain, job satisfaction seems the likely candidate. Indeed it is hard to imagine how this possibly could have been avoided. Even if researchers had taken the pains to create new items and had adopted different item formats (which they have not) there remains the psychological problem of divorcing description from feelings. Since descriptions of work situations have been operationally defined as indices of job satisfaction it seems redundant at best to also term such descriptions organizational climate (1975: 257).

Climate has traditionally been defined as a descriptive construct and satisfaction as an affective construct. However, these definitions get muddled operationally if satisfaction is measured through descriptors, as it is in the JDI, or if scales measuring climate include items on attitude. This problem probably is not crucial for the studies in this meta-analysis, because participation involves a specific microclimate, rather than omnibus organizational climate. Thus, it is not likely that measures of participative climate and overall work satisfaction are redundant. In addition, all of these studies considered descriptions of participation rather than attitudes toward participation as the independent variable. Finally, with the exception of studies using the JDI, measures of satisfaction were purely affective. Moreover, results of studies using the JDI were not systematically different from those of studies using other measures of satisfaction.

The question of causality remains: does participation cause satisfaction or does satisfaction cause participation? All of the studies in the multiple-issue subgrouping were correlational, so we cannot answer this question with full confidence. However, we can bring evidence from the literature on climate to bear on this issue. Laboratory research investigating experimentally created social climates (Litwin & Stringer, 1968) found that manipulated climate had an effect on satisfaction. Hand, Richards, and Slocum (1973) found a positive relationship between initial perceptions of climate and subsequent acceptance of self and others. Taylor and Bowers's (1972)³ cross-lagged panel study of over 284 work groups in 15 different organizations

³ LaFollette and Sims (1975) cited this study.

found that "organization climate shows evidence of being more the cause of, than caused by, satisfaction" (1972: 89).

Several concluding comments about the comparison between cognitive, affective, and contingency models of participation are in order. First, there was little support for contingency models of participation, though the lack of measures for several contingency variables could have affected findings. Second, this meta-analysis did not allow for a complete test of the models presented, as we lacked data on several intervening variables in these models, such as upward and downward sharing of information and satisfaction of higher-order ego needs. We would encourage researchers to measure these variables in future investigations of participation. Despite this limitation, some evidence to support both cognitive and affective models of participation emerged. The relatively large correlation between participation and productivity in field studies somewhat supports cognitive models. However, the largest subgroup correlation, between perceived participation and satisfaction, provides greater support for affective models of participation.

Estimates of the effect of participation on both satisfaction and productivity appeared in 13 studies. An examination of these studies sheds some light on the relative efficacy of cognitive and affective models: (1) the relationship between participation and satisfaction was stronger than that between participation and productivity in 4 studies (Katzell, Miller, Rotter, & Venet, 1970; Schuler & Kim, 1978; Shaw, 1955; Vroom, 1960), (2) the relationship between participation and productivity was stronger in one study (Ivancevich, 1977), and (3) no significant difference emerged in the other 8 studies. These studies provide somewhat stronger evidence for the relationship between participation and satisfaction than for that between participation and productivity. However, the large number of insignificant differences in this subset precludes our suggesting that this comparison provides strong evidence for either cognitive or affective models.

Research Setting as a Moderator

Several of the strongest moderators were methodological variables; in particular, research setting and type of subject played important roles. For the studies concerned with satisfaction, the variance was zero among investigations involving nonorganizational subjects, all but one of which (Veen, 1972) had a laboratory setting. The weighted correlation for these studies was relatively high ($r = .38$). This effect size was considerably higher than that in studies involving actual participation in organizations ($r = .16$) or perceived participation in reference to a specific issue ($r = .21$).

There are two clear explanations for these results. First, an explanation in terms of internal validity suggests that the high degree of control in laboratories over extraneous variables would make the higher correlation a better indicator of the true relationship between participation and satisfaction. However, an explanation in terms of external validity suggests that college students and laboratory tasks have little in common with real organizational life; hence, field estimates of the effect between participation and satisfaction

would be more meaningful. Both arguments undoubtedly have merit. This meta-analysis seems to indicate that there is a relatively high pure effect of participation on satisfaction, but that a host of other organizational influences dilute this effect in field studies investigating actual participation or perceived participation in relation to specific issues.

The effect of research setting in the productivity studies is also striking. Among studies not investigating goal setting, field studies showed a moderately high positive correlation ($r = .27$), and laboratory studies yielded either no correlation (assigned versus participative task manipulation, $r = -.01$) or negative correlations (authoritarian versus democratic leadership manipulation, $r = -.33$). The points of interest here are the sharp differences between laboratory and field studies and the differences in effect sizes for different manipulations.

The substantial difference between field and laboratory studies can probably be attributed to the tasks typically performed in these settings. The laboratory studies typically involved a simple and well-defined manipulated task like turning switches on a control panel or a game of twenty questions; the field studies typically involved participation in naturally occurring, more complex activities, such as pay incentive plans or job design, or participation over a wide gamut of organizational issues. In the laboratory, there usually was a correct answer; there are rarely such guarantees in organizations. Finally, organizational members in field studies had more at stake in the decisions that were made than students in a laboratory.

All of these factors contributed to a higher level of complexity for the organizational participative tasks than for the laboratory participative tasks. Research on small group behavior (Cartwright & Zander, 1960) has suggested that different types of leadership and structure are appropriate for different types of task; specifically, that authoritarian leadership and centralized group structure are most appropriate for simple tasks. The studies in this meta-analysis investigating leadership behavior bear this out. Most of the tasks were simple, and authoritarian leadership was more effective in eliciting high levels of productivity. In contrast, the field studies involving complex problems benefited more from participative processes. The lack of effects in the laboratory studies that manipulated the nature of a task is more difficult to interpret. It could be that in laboratory groups without defined leaders, such typical manipulations as assigned or participative groups are not strong enough to elicit effects on productivity.

Limitations

Though the results of this meta-analysis are relatively clear, our procedure had several limitations. First, this analysis dealt entirely with published research. It has long been argued that published studies have larger effect sizes than unpublished studies, and there is some evidence for this claim (Smith & Glass, 1977). However, as Hunter, Schmidt, and Jackson pointed out, unpublished effect sizes may be smaller because of methodological quality, and "if attenuation effects were properly corrected for, differences

might disappear" (1982: 30). Second, it has been argued that meta-analysis gives the same weight to good studies as to bad ones. We dealt with this problem in two ways, (1) by eliminating studies with severe methodological problems or interpretative difficulties, and (2) by attempting throughout the analysis to account for variance through the use of methodological moderators. If the quality of studies' designs or measurements accounted for differences in effect sizes, the meta-analytic techniques employed should have accounted for the differences.

Finally, it should be noted that our techniques allowed for the assessment of bivariate relationships. In this case, the relationships investigated were participation and satisfaction, and participation and productivity. However, the affective, cognitive, and contingency models under examination were much more complex than the simple bivariate relationships examined in the meta-analysis. Thus, although the meta-analysis produced important information that provided varying levels of support for the models, it did not provide the information necessary to test one model or another completely.

CONCLUSIONS AND FUTURE DIRECTIONS

In spite of these limitations, this research supports some current wisdom about the effects of participation and extends our knowledge of the participative process in organizations in important ways. First, the meta-analysis provides some support for the conclusions reached by Locke and Schweiger (1979). Participation has an effect on both satisfaction and productivity, and its effect on satisfaction is somewhat stronger than its effect on productivity. This meta-analysis allowed us to be more explicit about these effects. As Figures 1 and 2 demonstrate, we can now make quite precise statements about the magnitude of the effect of participation on satisfaction and productivity. In addition, strong evidence exists for a consistent and substantial effect of research setting in these studies, because consideration of this methodological variable considerably reduces the variance among studies. Finally, our analysis indicates specific organizational factors that may enhance or constrain the effect of participation. For example, there is evidence that participative climate has a more substantial effect on workers' satisfaction than participation in specific decisions, and it appears that participation in goal setting does not have a strong effect on productivity.

These conclusions provide some clear avenues for future research. It is important for organizational scholars to conduct research that can specifically test the relationships in the cognitive and affective models. For instance, research contrasting the effects of both participative climate and participation in relation to specific issues on both satisfaction and productivity could lead to an important clarification of the cognitive and the affective processes at work in participative situations. Researchers should also extend our consideration of contingency variables to areas this meta-analysis highlights. For example, the contrast between studies of participative climate and studies of participation in relation to specific issues suggests that organizations with

formal systems of participation may differ greatly from organizations in which participativeness is an informal managerial norm. Our investigation (Miller & Monge, 1986) of the Scanlon plan of participative management suggests that this might be the case. Future research could also usefully consider the development of participative systems and norms in organizations over time. Longitudinal research of this nature could help clarify the causal structure of the relationships among participation, satisfaction, and productivity. Finally, the meta-analytic procedure itself could be usefully extended to allow for the testing of relationships that go beyond the simple bivariate level.

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PREDICTORS AND CONSEQUENCES OF DELEGATION

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This research examined predictors and consequences of delegation. Participants were 44 supervisors and 198 claims adjusters employed in 19 branch offices of a large insurance company. Delegation was operationally defined as the dollar level of authority exercised by adjusters to settle claims. Results indicated that supervisors' perceptions of subordinates, the volume of supervisors' workloads, and the importance of decisions were significant predictors of delegation. In addition, subordinates' job competence and congruence between supervisors' and subordinates' goals moderated the effects of delegation on subordinates' job performance. Neither supervisors' personalities or predispositions to share authority nor subordinates' satisfaction were significantly related to delegation. Implications of the findings for research on participative decision making and leadership are discussed.

Although many researchers have examined subordinates' involvement in decision making, little empirical research has focused on delegation as a distinct management practice. Several models of leadership and decision making have included delegation as one point on a continuum of leader-subordinate processes (Heller, 1971; Tannenbaum & Schmidt, 1958; Vroom & Yetton, 1973). Researchers have paid far more attention, however, to subordinates' involvement through joint or participative decision making and have largely ignored delegation or treated it as a subset of participative decision making.

A close examination of management practices indicates that this neglect of delegation is unwarranted. Bass and Valenzi (1974), for example, found participative decision making to be only slightly more prevalent than delegation in a variety of organizations. Moreover, the literature for practitioners is replete with descriptions and suggestions concerning why, how, and under what circumstances managers should delegate decision making authority (e.g., McConkey, 1974; Steinmetz, 1976). In fact, anecdotal accounts and research that only indirectly addresses delegation within global models of leadership are thus far the main sources of information about this practice.

This research was part of a doctoral dissertation completed at the University of Houston in 1984. The author appreciates the assistance of the committee's chairman, Arthur Jago, and members, Jack Ivancevich, Jim Phillips, and David Schweiger. The suggestions of Chet Schriesheim and various reviewers are also greatly appreciated.

The purpose of this research was to address these gaps in the empirical literature by focusing directly on delegation. Encompassing both descriptive and normative issues in examining delegation's occurrence and its effectiveness, this study addressed two questions: (1) why are some subordinates delegated more decision making authority than others? and (2) under what circumstances is delegation an effective decision making process? In order to address these questions, it is important first to define the concept of delegation and distinguish it from other forms of subordinates' involvement in decision making.

DELEGATION AS A DECISION MAKING PROCESS

Many writers who have addressed delegation have done so in the context of participative decision making. Some (Strauss, 1963; Yukl, 1981) have defined delegation as a subset of participative decision making, and others (Bass, 1981; Locke & Schweiger, 1979) have defined it as distinctly different. In either case, most treatments of delegation have included it on continua of processes by which subordinates may be involved in decision making (cf. Bass & Valenzi, 1974; Heller & Yukl, 1969; Strauss, 1963; Tannenbaum & Schmidt, 1958; Vroom & Yetton, 1973). These continua, which depict the locus of authority in making decisions, are typically anchored on one end by completely autocratic decision making, and on the other end by processes that permit maximum influence by subordinates. Vroom and Yetton, for example, distinguished among autocratic, consultative, joint, and delegative methods of decision making. Heller and Yukl described a similar continuum, as did Tannenbaum and Schmidt, Bass and Valenzi, and Heller (1976).

Like many definitions of participative decision making, most definitions of delegation stress a transfer of authority that takes place between managers and subordinates. Heller and Yukl, for example, suggested that "delegation refers to decisions that the manager allows subordinates to make on their own" (1969: 230). Bass (1981: 235) and Locke and Schweiger (1979: 274) offered similar definitions of delegation, and Strauss suggested that delegation "is to be contrasted with situations where superiors make decisions either alone or jointly" (1963: 70). These definitions suggest that, on a continuum depicting manager-subordinate decision making authority, delegation is the direct opposite of autocratic decision making, and participation is the midpoint between autocratic and delegative arrangements.

Thus, delegation differs from other decision making processes like participation or consultation in two primary ways. First, it typically involves decision making by an individual subordinate rather than by a group of subordinates or a supervisor-subordinate dyad (Heller, 1976). Second, and more important, delegation stresses subordinates' autonomy in making decisions (Locke & Schweiger, 1979; Strauss, 1963). Much of the research directly or indirectly addressing delegation has been either descriptive or normative. The descriptive research has focused on the occurrence of delegation and suggested distinctions among managers, distinctions among subordinates, and task or situational constraints that might limit the authority delegated

to subordinates. The normative research, on the other hand, has focused on delegation's effectiveness, typically defining this effectiveness in terms of subordinates' job performance and satisfaction.

PREDICTORS OF DELEGATION

Distinctions Based on Supervisors' Characteristics

An impressive body of research has addressed the relationship between managers' personality traits and predispositions to share authority and subordinates' participation in decision making. Although Stogdill (1948) and others raised serious criticisms of this trait approach, situational studies of subordinates' participation have consistently found some variance, albeit modest, attributable to leaders' predispositions to share authority (Steers, 1977; Vroom & Jago, 1974). Researchers have given little attention, however, to managers' propensities to delegate authority. In one of the few such experiments conducted to date, Ashour and England (1972) examined the effects of leaders' dominance and authoritarianism on the level of discretion they were willing to assign to subordinates. Results indicated that leaders high in dominance tended to delegate nondiscretionary tasks to subordinates, and leaders low in dominance delegated more discretionary tasks. The study found no significant effects for leaders' authoritarianism.

Other writers have examined managers' predispositions to share authority through studying attitudes and perceptions rather than more fundamental personality traits. Schneider (1983) suggested that managers may have idiosyncratic profiles of appropriate leadership behavior, independent of situations. Thus, they may differentially employ delegation on the basis of their perceptions of proper supervisory role behavior. Managers who view their roles primarily in terms of providing direction for subordinates may rely more on autocratic decision making and less on delegation than will managers who view subordinates' development as a primary component of effective supervision. Thus, both their personality attributes and role perceptions may influence the extent to which managers delegate authority to subordinates.

Hypothesis 1: Subordinates whose supervisors have a high need for dominance will be delegated less authority than will subordinates whose supervisors have a low need for dominance.

Hypothesis 2: Subordinates whose supervisors perceive providing direction as important to their roles will be delegated less authority than will subordinates whose supervisors perceive providing opportunities for subordinates' development as important.

Distinctions Based on Subordinates' Characteristics

Other theorists have suggested characteristics of subordinates as determinants of leaders' behavior. According to the vertical dyad linkage (VDL)

theory, for example, managers grant differential degrees of role latitude to subordinates on the basis of their perceptions of each subordinate's capability, trustworthiness, and motivation to assume greater responsibility (Dansereau, Graen, & Haga, 1975; Graen & Cashman, 1974; Liden & Graen, 1980). Early in their relationships, managers identify subordinates as belonging to "in," "middle," or "out" groups (Liden & Graen, 1980: 452). Moreover, research conducted by Graen and his colleagues suggests that members of in groups perceive themselves as having more autonomy in defining their job roles than do their middle- or out-group counterparts. It is not clear, however, whether delegation actually occurs as a result of these different manager-subordinate relationships or whether in-group members merely perceive it to occur.

The work of Vroom and his colleagues also addresses the relationship between subordinates' attributes and delegation. Vroom and Yetton (1973) proposed both normative and descriptive models predicting that subordinates' involvement in decision making—including delegation—will vary with the attributes of particular decisions and subordinates involved. They proposed only two attributes as playing important roles in determining delegation's application to nontrivial problem solving, predicting that managers will delegate in such situations only if subordinates: (1) share their own organizational goals, and (2) have sufficient information to make good decisions.

Vroom and Jago's (1974) investigation of the descriptive accuracy of this model revealed that managers' responses to standardized case scenarios significantly agreed with its predictions. This finding concurs with results of research by Graen and his colleagues: managers grant subordinates whom they perceive to be capable and trustworthy more discretion in performing their work. Vroom and Yetton's model and VDL theory disagree, however, on the importance of other situational constraints. Vroom and Yetton (1973) concentrated on matching specific attributes of subordinates with particular decision tasks. The VDL model, on the other hand, seems to imply that nonsituational and global ratings of subordinates' attributes are the primary determinants of differences in the authority they receive. Despite this difference between the two approaches, both converge on managers' perceptions of subordinates as primary determinants of the amount of authority delegated.

Hypothesis 3: Subordinates who are perceived by their supervisors to be capable, responsible, and trustworthy will be delegated more authority than will subordinates who are perceived to be less capable, responsible, and trustworthy.

Distinctions Based on Situational Factors

Further examination of the data originally reported by Vroom and Jago (1974) indicated that, in addition to characteristics of subordinates, managers also considered the relative importance of decisions, or requirements for quality, when making choices on delegation (Leana, 1984). In essence, a decision's importance was inversely related to delegation: managers

indicated that they would be more willing to delegate decisions with, in Vroom and Yetton's (1973) terminology, low quality requirements.

This inverse relationship between delegation and a decision's importance also emerged in Heller's (1971, 1973) research, in which managers reportedly used delegation less than 5 percent of the time when decisions had some organizational importance. Thus, in both correlational field research (Heller, 1971, 1973) and in experimental laboratory studies (Vroom & Jago, 1974; Vroom & Yetton, 1973), managerial use of delegation was inversely related to the organizational importance of the decisions involved.

Hypothesis 4: The level of authority delegated to subordinates will be inversely related to the organizational importance of the decisions they make.

Another situational variable that may influence delegation is a manager's workload. As Yukl suggested, "decisions may be delegated because the manager responsible for them is overloaded and unable to give the decision adequate attention" (1981: 227). Although little research exists to directly support Yukl's contention, indirect evidence includes the findings of Janis and Mann (1977), who suggested that decision makers under pressure may engage in defensive avoidance by shifting responsibility for choices. In addition, Vroom and Yetton's short-term model emphasized time efficiency in decision making and favored delegation over consultation or participation when all figured in the "feasible set" (Vroom & Jago, 1974: 747). The literature for practitioners has also suggested a positive relationship between managers' workloads and delegation and has long touted the use of delegation as an effective form of time management (McConkey, 1974).

Hypothesis 5: Subordinates whose supervisors are facing greater workloads will be delegated more authority than will subordinates whose supervisors face lesser workloads.

CONSEQUENCES OF DELEGATION

Two potential outcomes of subordinates' participation in decision making that have received considerable attention are subordinates' job performance and satisfaction (Locke & Schweiger, 1979). It seems reasonable to expect that these same outcomes may be associated with delegation. However, as with participation, the relationships between delegation and subordinates' performance and satisfaction may be indirect and moderated by situational factors.

Many researchers investigating leadership have suggested situational circumstances that might mitigate the effectiveness of managers' attempts to structure subordinates' behavior or tasks (House, 1971; Kerr & Jermier, 1978), but Vroom and Yetton (1973) were the most specific regarding relationships between antecedents, delegation, and consequences. As noted, they suggested that managers use delegation only when they perceive subordinates as sharing their organizational goals and having all necessary information. Additionally, in their normative model they predicted that delegation is effective only when these two conditions actually prevail.

Hypothesis 6: Delegation will be more positively related to performance for subordinates demonstrating high job competence and indicating strong agreement with supervisors' goals than for less competent subordinates and those indicating low agreement with supervisors' goals.

Although Vroom and Yetton's normative model is quite specific in its predictions regarding delegation and effective decision making, it does not specify circumstances that might moderate the relationship between delegation and subordinates' satisfaction. However, other leadership contingency theories suggest circumstances that might influence how satisfied subordinates are with the degree of direction their managers employ. For example, the path-goal theory of leadership (House, 1971) implies that subordinates' job competence partially determines the appropriateness of managers' attempts to structure their behavior and tasks (House & Baetz, 1979).

Hypothesis 7: Delegation will be more positively related to job satisfaction and satisfaction with supervision for subordinates demonstrating high job competence than for subordinates demonstrating low job competence.

The first five of the seven hypotheses make predictions regarding the levels of authority that might be delegated to subordinates. The remaining two concern the consequences of delegation. Figure 1 summarizes the hypothesized relationships.

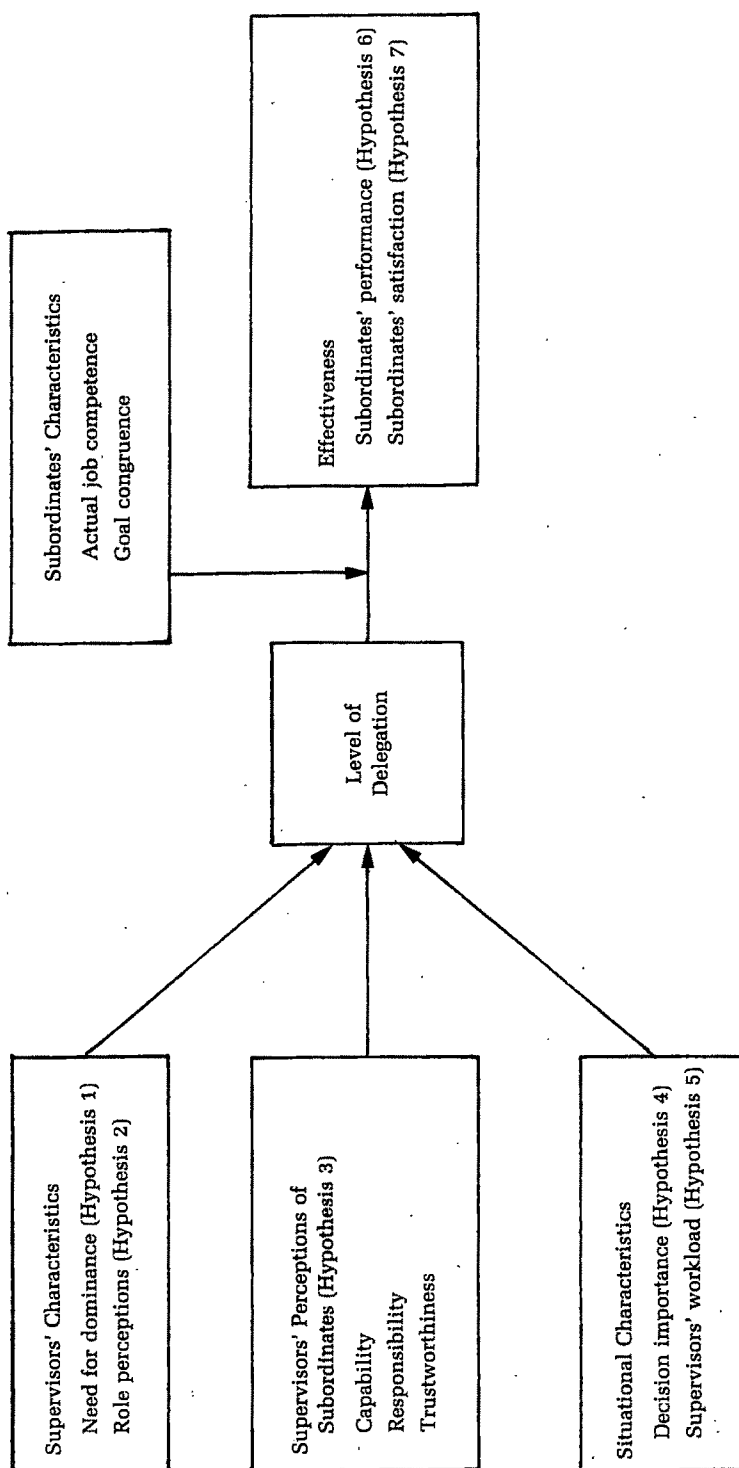
METHODS

Research Sites and Respondents

The research sites, 19 branch claims offices of a large national insurance company, were located in ten southwestern cities that were governed by three regional claims offices. Each branch office was responsible for processing personal insurance claims filed by claimants within its geographic jurisdiction. This processing consisted of investigating claims and awarding insured persons dollar settlements based on assessments of damages. The branch offices processed only personal insurance claims—insurance for individuals and individual property—handling claims ranging from automobile damage to personal liability settlements.

These branch offices had similar structures, with one manager supervising an office and one to three supervisors each directing the work of three to eight claims adjusters. Neither the managers nor the supervisors settled claims directly; this was the task of the claims adjusters. The branch office managers assigned claims to adjusters by rotation. Managers and supervisors oversaw the work of the claims adjusters and became directly involved in claims settlements only when their subordinates requested or required their particular expertise or authority. Thus, for many claims, supervisors acted as consultants to claims adjusters who had primary responsibility for assessing the amounts of settlements. Branch managers also acted as consultants to specific adjusters who reported directly to them. The supervisors reported

FIGURE 1
Predictors and Consequences of Delegation



directly to the branch managers who, in turn, reported to a regional claims manager.

Respondents included 198 claims adjusters and the 44 supervisors to whom they reported.¹ In nearly all of the branch claims offices, one to three adjusters reported directly to the manager rather than through a supervisor. The managers also participated in the research, so these adjusters were retained as respondents. Eighty-two percent of the claims adjusters were men, and the mean age of all adjusters was 39 years (*s.d.* = 17). On average, the claims adjusters had worked six and one half years in their present capacities (*s.d.* = 6) and eight years in the insurance industry (*s.d.* = 8). All of the branch office managers were men, as were 76 percent of the supervisors. The average age of all managers and supervisors was 44 years (*s.d.* = 5). Their average tenure with the company was over 13 years (*s.d.* = 9.5), and the mean number of years of supervisory experience was eight years (*s.d.* = 8). On average, the supervisors had worked over 16 years in the insurance industry (*s.d.* = 11).

Procedures

Both questionnaires and archival records provided data. The questionnaires, one format for supervisors and one for claims adjusters, were distributed to respondents during working hours and were accompanied by instructions that they were to be completed off-duty. Each branch office manager provided an organizational chart that depicted the hierarchical reporting relationships in his office so that claims adjusters could be matched with their supervisors. Each claims adjuster and supervisor received a code number. Questionnaire packets bore employees' names, but for confidentiality the completed questionnaires and return envelopes had only code numbers; respondents were instructed not to mark their names anywhere on the packets. A cover letter from the appropriate branch office manager asking for voluntary participation in the research accompanied each questionnaire. Respondents returned completed questionnaires to a nonparticipating administrative employee in each branch office who forwarded them directly to the researcher. The insurance company's employees completed and returned 97 percent of all questionnaires that had been distributed in the 19 offices.

The managers' administrative assistants provided archival data taken from uniform computerized reports distributed by the three regional claims managers. These reports contained quarterly performance measures for each claims adjuster.

Measures

Supervisors' characteristics. Items included in the questionnaire completed by supervisors and branch office managers measured two character-

¹ All adjusters and supervisors in the 19 branch offices were included in the study, but because of clerical oversights in some of the offices, performance data on some adjusters was lacking. These reduced sample sizes for some analyses are indicated in the appropriate tables.

istics, need for dominance and perceptions of their roles as supervisors. Five items from Steers and Braunstein's (1976) Manifest Needs Scale were used to assess need for dominance; for this population, the internal consistency estimate (α) of the scale was .68. Four items on the supervisors' questionnaire assessed supervisors' perceptions of their roles. The Appendix lists these items, which were constructed for and focused on respondents' agreement with statements addressing the perceived effectiveness of close supervision. The internal consistency (α) of this scale was .56.

Supervisors' perceptions of subordinates. Following Liden and Graen's (1980) specification of criteria used by managers to make distinctions concerning subordinates' role discretion, the study assessed supervisors' perceptions of each of their subordinates' capability, trustworthiness, and motivation to assume greater responsibility. The approach differed from that of Liden and Graen (1980) and other VDL researchers, however, in that it directly asked supervisors to report their perceptions of each subordinate rather than inferring these perceptions from subordinates' reports of supervisors' behavior. Supervisors were asked to position the initials of all of their subordinates on each of nine 15-centimeter lines anchored by descriptors at either end. The Appendix lists these nine items, three for each of the three constructs—capability, responsibility, and trustworthiness. Ratings ranged from 1 through 15, according to proximity to the closest centimeter; internal consistency estimates for the measures of claims adjusters' capability, responsibility, and trustworthiness were .91, .85, and .71, respectively. The nine items had a median intercorrelation of .87 ($\alpha = .92$). Thus, only the overall nine-item measure was used in subsequent analysis.

Subordinates' goal congruence. The regional claims managers, who were the branch managers' supervisors, provided organizational goals. By consensus, these three managers compiled a list of nine objectives that adjusters were to strive to satisfy in making decisions on claims settlements. Both subordinates and supervisors were asked to rank order the nine items. Reversed scores of deviations represented by the sum of the absolute differences between supervisors' and subordinates' rankings constituted each subordinate's goal congruence score. Thus, a high score on this measure indicated strong agreement between a subordinate and a supervisor on the importance of various objectives in settling claims, and a low score indicated weak agreement. The Appendix lists the nine items used to derive these scores.

Subordinates' satisfaction. Two aspects of claims adjusters' satisfaction were assessed, both taken from the Job Diagnostic Survey (Hackman & Oldham, 1975). A global measure of job satisfaction contained five items ($\alpha = .77$), and satisfaction with supervision contained three items ($\alpha = .92$).

Archival Data

Degree of delegation. Supervisors assigned all claims adjusters settlement authority levels for processing insurance claims. These settlement

authorities represented the dollar amounts for which they could award damages on claims without consulting their supervisors and obtaining approval. When the assessed damages on a claim exceeded an adjusters' settlement authority level, no check could be issued to settle the claim until the adjuster's supervisor approved the settlement. Thus, the settlement authority levels indicated the autonomy with which the claims adjusters were able to carry out their work and essentially limited the degree to which they could make specific decisions on claims.

Claims adjusters' settlement authorities were used in this research to indicate levels of delegation. Supervisors reviewed these authority levels annually and, where appropriate, adjusted them. The settlement authorities used in this research were those in effect as of January 1984. These varied among adjusters both within and between supervisory units, ranging from \$500 to \$30,000, with a mean of \$7,500 (s.d. = \$4,706).

Decision importance. The types of claims handled by each adjuster provided this measure. The three regional claims managers ranked the importance of different types of claims by consensus. In order of importance these were: (1) personal liability claims, (2) workers' compensation claims, (3) homeowners' property damage claims, and (4) automobile property damage claims. The regional claims managers based their ordering of importance primarily on the degree to which decisions on damage awards were judgmental rather than procedural and thus more dependent on adjusters' expertise. Moreover, the claims types judged to be more important typically entailed larger dollar settlements, and claimants were more likely to contest them through litigation.

Supervisors' workload. The volume of claims supervisors had managed over the six months preceding the establishment of settlement authorities for the claims adjusters (July 1–December 31, 1983) provided this measure. Volumes ranged from 166 to 4,572 claims, with a mean of 1,452 (s.d. = 1,004).

Subordinates' performance. The job performance of claims adjusters was assessed with two measures of claims activity and costs that were systematically recorded in the regional claims offices and were similar to those commonly used throughout the insurance industry. The two performance measures were (1) settlement ratio, and (2) average cost of claims. A settlement ratio, or number of settled claims as a proportion of the total number of claims assigned to an adjuster, essentially indicates an adjuster's work efficiency. The average cost of claims refers to the average dollar amount for which each adjuster settled claims. This measure is quite different from the measure of delegation, settlement authority, which indicates the largest dollar amount for which an adjuster could settle claims without seeking supervisory approval. Average cost of claims indicates the average dollar amount paid on the total number of claims handled by each adjuster.

All data reflected performance by adjusters from January 1 through March 31, 1984. Because this period directly followed the annual review and adjustment of settlement authority levels, supervisors had just made their recommendations regarding the amounts of authority to delegate to each adjuster.

Subordinates' job competence. Adjusters' previous performance, as measured by settlement ratios and average costs of claims for the period July 1 through December 31, 1983, served as measures of job competence. This period directly preceded the January 1 review and adjustment of settlement authority levels. Thus, the competence measures assessed performance prior to supervisors' recommendations, and the job performance measures covered the period directly following the resetting of levels of delegation.

RESULTS

Occurrence of Delegation

Table 1 presents the means, standard deviations, and correlations among levels of delegation, as measured by settlement authority, and the hypothesized predictors and consequences of delegation depicted in Figure 1. Three of the five hypothesized predictors were significantly correlated with levels of delegation, but supervisors' need for dominance and role perceptions had no significant relationship with delegation. Conversely, the correlation between delegation and supervisors' perceptions of subordinates was comparatively strong. Both supervisors' workload and decision importance were also significantly correlated with delegation.

Interestingly, the correlations between supervisors' perceptions of subordinates and the objective measures of subordinates' job competence were quite weak ($r = -.03$, settlement ratio; $r = .05$, cost of claims). Not surprisingly, however, the job competence measures were significantly correlated with the matched measures of job performance ($r = .35$, settlement ratio; $r = .68$ cost of claims). Inquiries to the regional claims managers regarding possible reasons for the low correlations between supervisors' perceptions and the objective competence data revealed that, in general, supervisors did not appear to closely examine the performance statistics of the claims adjusters reporting to them, although they could. Thus, the bases on which supervisors formed their perceptions of subordinates were unclear. Supervisors' overall perceptions were significantly, but not strongly, correlated with subordinates' job tenure ($r = .14$, $p < .01$), but not with subordinates' educational level ($r = .05$). None of the measures of subordinates' job competence and performance were significantly correlated with job tenure or educational level.

To examine each predictor's contribution to explaining variance in the level of delegation, the study used multiple regression analysis, entering the predictors hierarchically and examining the incremental variance attributable to each. Since supervisors' characteristics were conceived as relatively stable traits and predispositions, these were expected to exert the most fundamental influences on supervisors' behavior and were thus entered first. Supervisors' perceptions of subordinates were entered next in the model, followed by the two situational factors, decision importance and supervisors' workload. This order of entry provided the most statistically powerful test of the effects of the person—those based on supervisors' predispositions and

TABLE 1
Means, Standard Deviations, and Correlations
of Predictors and Consequences of Delegation^a

Variables	1	2	3	4	5	6	7a	7b	8	9a	9b	10a	10b
1. Level of delegation ^b													
2. Supervisors' need for dominance	.00												
3. Supervisors' role perceptions	.03	.13*											
4. Supervisors' perceptions of subordinates	.30**	.06	-.07										
5. Decision importance ^c	-.19**	-.25**	.04	-.02									
6. Supervisors' workload ^d	.17*	.43**	.12	-.02	-.51**								
7. Subordinates' job competence													
a. Settlement ratio, 1983	.04	-.03	.00	-.03	.05	-.01							
b. Cost of claims, 1983	-.30**	-.18*	-.06	.05	.29**	-.34**	-.04						
8. Supervisor-subordinate goal congruence	.01	.12	.01	.04	.01	-.08	.11	-.05					
9. Subordinates' job performance													
a. Settlement ratio, 1984	.19*	-.14*	.16*	.03	.06	.03	.35**	.03	.07				
b. Cost of claims, 1984	-.20**	-.05	.05	.05	.29**	-.31**	-.04	.62**	-.14	.05			
10. Subordinates' satisfaction													
a. With job	.03	.03	-.05	.17*	.02	-.08	.04	.03	.06	-.08	-.17*		
b. With supervision	.11	-.14*	-.11	.23**	-.03	-.06	.04	.07	.01	-.03	-.21**	.51	
Means	7.500	4.87	6.06	10.52	2.06	1.452	.95	1.391	13.94	.90	1.622	5.14	5.35
Standard deviations	4.706	.78	.68	2.77	.89	1.004	.70	.931	5.60	.40	1.017	1.09	1.36
Alphas	—	.68	.58	.92	—	—	—	—	—	—	—	.77	.92

^a n = 198.

^b Measured as level of settlement authority.

^c n = 126; adjusts handling multiple claim types were deleted from the population; measured as type of claims.

^d Measured as volume of claims.

* p < .05

** p < .01

perceptions—and a more conservative test of situational effects. Table 2 presents the incremental variance in delegation levels attributable to each predictor. The reported beta weights and changes in R^2 reflect the hierarchical ordering and represent incremental effects attributable to each predictor after predictors at previous steps were partialled out; multiple predictors within each step were entered simultaneously.

As might be expected from the correlations presented in Table 1, supervisors' characteristics contributed little to explaining variance in levels of delegation. In contrast, supervisors' perceptions of subordinates and the two situational characteristics, decision importance and supervisors' workload, were significant predictors. Thus, these data supported Hypotheses 3, 4, and 5, but not Hypotheses 1 and 2. All predictors taken together explained 13 percent of the variance in levels of delegation.

Consequences of Delegation

Moderated multiple regression analysis was used to test the proposed relationships between delegation and subordinates' performance and satisfaction. Peters and Champoux (1979), Arnold (1982), and others have recommended this regression approach when examining what is essentially an interaction among predictor variables on some criterion. Tables 3 and 4 present the results of these regression analyses. Table 3 presents data testing the predictions in Hypothesis 6 concerning delegation and job performance, and Table 4 presents data testing the predictions in Hypothesis 7 concerning delegation and satisfaction.

The data analyzed concerned both adjusters' competence, based on settlement ratios and average costs of claims before January 1, and their performance, based on these measures after January 1. To check for possible confounding of any of these measures with the importance of the claims processed by each adjuster, one-way analyses of variance were conducted. These analyses examined possible differences in settlement ratios and average claims costs for both 1983 and 1984 as a function of the type of claim in which each adjuster specialized. For the analyses of the settlement ratios, no significant differences emerged across types of claims for either 1983 ($F = .952$) or 1984 ($F = .552$). For the average cost of claims, however, there were significant differences in both 1983 ($F = 8.88, p < .01$) and 1984 ($F = 3.82, p < .05$) among the types of claims.² To correct for this confound, a deviation score was calculated by subtracting each adjuster's average claim cost from the unit's mean cost, the average cost for all adjusters handling similar types of claims. Thus, both the competence and the performance measures of average costs of claims used in the analyses reported in Tables 3 and 4

² Costs of claims were inversely related to settlement authority, most likely because of differences in settlement authority based on the types of claims in which adjusters specialized. Automobile property claims, for example, are typically least costly, yet these adjusters tend to have high settlement authorities. Thus, adjusters handling automobile damage claims had significantly lower average costs but higher settlement authorities than adjusters specializing in property damage or liability settlements.

TABLE 2
Hierarchical Regression Analysis of Predictors of Delegation^a

Independent Variables	Predicted Relationships	Levels of Delegation ^b			
		Betas	Changes in R^2	\bar{F}	Total R^2
Step 1					
Supervisors' need for dominance	—	.016	.00	.03	.00
Supervisors' role perceptions	+	.049	.00	.31	.00
Step 2					
Supervisors' perceptions of subordinates	+	.256	.07	8.60**	.07
Step 3					
Decision importance ^c	—	-.187	.03	4.38*	.10
Supervisors' workload ^d	+	.220	.03	4.69*	.13

^a $n = 126$; adjusters handling multiple claims types were deleted from population.

^b Measured as levels of settlement authority.

^c Measured as type of claims.

^d Measured as volume of claims.

* $p < .05$

** $p < .01$

TABLE 3
Moderated Regression Analyses of the Effects of Level of Delegation, Job Competence, and Goal Congruence on Claims Adjusters' Job Performance

Independent Variables	Betas	Changes in R^2	F	Total R^2
(a) Job Performance Measured as Settlement Ratio, 1984^a				
Level of delegation	.184	.03	3.83*	.03
Job competence	.660	.44	88.47*	.47
Interaction	.585	.04	9.48*	.51
Level of delegation	.184	.03	3.83*	.03
Goal congruence	.076	.00	.58	.03
Interaction	.869	.04	4.72*	.07
(b) Job Performance Measured as Deviation from Unit's Mean Cost of Claims, 1984^b				
Level of delegation	.289	.08	10.17**	.08
Job competence	.545	.25	41.76**	.33
Interaction	.228	.04	7.31*	.37
Level of delegation	.289	.08	10.17**	.08
Goal congruence	.122	.02	1.96	.10
Interaction	.676	.05	7.47**	.15

^a $n = 111$; level of delegation measured as settlement authority; job competence measured as settlement ratio, 1983.

^b $n = 114$; level of delegation measured as settlement authority, job competence measured as deviation from unit's mean cost of claims, 1983.

* $p < .05$

** $p < .01$

TABLE 4
Moderated Regression Analyses of the Effects of Level
of Delegation and Job Competence on Claims Adjusters' Satisfaction

Independent Variables	Betas	Changes in R^2	F	Total R^2
(a) Global Job Satisfaction				
Level of delegation ^a	.033	.00	.09	.00
Job competence ^b	.040	.00	.27	.00
Interaction	.022	.00	.00	.00
Level of delegation ^c	.030	.00	.12	.00
Job competence ^d	.004	.00	.00	.00
Interaction	.014	.00	.02	.00
(b) Satisfaction with Supervision				
Level of delegation ^a	.113	.01	1.59	.01
Job competence ^b	.040	.00	.23	.01
Interaction	.116	.00	.16	.01
Level of delegation ^c	.101	.01	1.40	.01
Job competence ^d	.048	.00	.27	.01
Interaction	.027	.00	.08	.01

^a $n = 111$; measured as settlement authority.

^b Measured as settlement ratio, 1983.

^c $n = 139$; measured as settlement authority.

^d Measured as deviation from unit's mean cost of claims, 1983.

represent each adjuster's average cost deviation from a unit's mean. A high score indicated better than average performance by an adjuster.

Delegation and subordinates' performance. Table 3 reports beta weights, changes in R^2 , and F values for the moderated regression analyses of claims adjusters' job performance. To test for and control the effects of delegation and competence on performance, levels of delegation and the job competence measures were entered in the first and third regression analyses reported in Table 3; the cross-products of delegation and competence followed. To test Hypothesis 6, the analyses focused on the incremental contributions of these cross-product terms to explaining variance in adjusters' performance after the direct effects of delegation and competence on the performance variables had been partialled out. As indicated by the significant changes in R^2 , the competence measures significantly moderated the relationship between delegation and performance. Delegation was positively related to both performance measures for adjusters with high levels of job competence. Conversely, for adjusters lower in competence, high levels of delegation were related to low performance.

Thus, although both delegation and job competence individually explained a significant portion of the variance in adjusters' performance, their interaction explained a significant portion of variance in performance beyond that explained by either factor acting alone. These significant interaction effects are particularly noteworthy in light of the use of previous performance as the operational definition of job competence. As Table 1 shows,

the two job competence measures, assessing 1983 performance, and the matched measures of performance in 1984 were highly correlated ($r = .35$, settlement ratio; $r = .62$, cost of claims). The large incremental R^2 attributable to the main effect for competence in both regression analyses reflected these significant correlations. However, the interaction of delegation and competence still explained a significant portion of the variance in both performance measures after the rather substantial direct effects of job competence had been partialled from the analyses. Moreover, the measures of delegation, competence, and performance were all objective rather than perceptual assessments; thus, the relationships among them were not subject to erroneous inflation due to respondents' perceptual biases.

Using goal congruence rather than competence as the moderator yielded similar results. As shown in the second and fourth analyses in Table 3, the cross-product of delegation and goal congruence explained a significant portion of the variance in both measures of performance. Claims adjusters who demonstrated strong agreement with supervisors' goals performed better at high levels of delegation. Although subordinates low in goal congruence also performed better at high levels of delegation, the performance increments were significantly greater for subordinates who showed strong agreement with supervisors' goals. Thus, both goal congruence between supervisors and subordinates and subordinates' job competence significantly influenced the relationship between delegation and performance, supporting the predictions made in Hypothesis 6.

Delegation and subordinates' satisfaction. Table 4 presents the results of analyses examining the relationship between delegation and claims adjusters' satisfaction. Hypothesis 7 predicted significant interactions between delegation level and adjusters' job competence, affecting both global job satisfaction and satisfaction with supervision. However, neither measure of job competence significantly moderated the relationship between level of delegation and level of job satisfaction or satisfaction with supervision. Moreover, there were no significant effects for delegation nor competence acting alone on either satisfaction measure. These data, then, failed overall to support Hypothesis 7: delegation levels, job competence, and their interaction did not influence claims adjusters' reports concerning satisfaction.

DISCUSSION

This research focused exclusively on delegation as a means of involving subordinates in organizational decision making. As such, it represented a significant departure from previous research focusing exclusively on participation or examining delegation as only one point on a continuum of subordinates' involvement in decision making. The results reported here also have implications for the more traditional literature on participative decision making and for more recent approaches to the study of leadership and leaders' behavior.

Delegation and Participation

Previous research has consistently reported a positive relationship between subordinates' participation in decision making and their satisfaction, although the effects of participation on subordinates' performance have been far less clear (Locke & Schweiger, 1979; Schweiger & Leana, 1986). The current findings are, however, inconsistent with conclusions drawn by Locke and Schweiger and others concerning participative decision making. In this research, delegation was a significant predictor of subordinates' job performance. Moreover, delegation interacted with subordinates' competence and goal congruence in affecting performance. Conversely, there was no significant relationship between delegation and subordinates' job satisfaction or satisfaction with supervision.

Important theoretical and operational distinctions between delegation and participative decision making may in part account for these apparent inconsistencies. As a human relations concept, associated with power equalization and social interaction (Heller, 1976), participation implies group or dyadic decision making, with managers and subordinates democratically choosing decision outcomes. Conversely, delegation is an aspect of a human resource approach that emphasizes workers' autonomy and enhanced responsibility for subordinates. Delegation implies moving the locus of decision making authority from one organizational level to another lower one and distributing rather than sharing power (Locke & Schweiger, 1979). Delegation, moreover, is an individual rather than a collective phenomenon and thus is unlikely to convey any potential attitudinal benefits that may be associated with social interaction, such as satisfaction with jobs or supervision. An intriguing possibility is that the positive affective states often associated with participative decision making may be more a result of group identification than of enhanced work responsibility and control. Delegation permits subordinates autonomy in decision making, yet the data reported here indicated no relationship between delegation and attitudes toward work or supervision. Thus, the results of this research confirm the potential differences between delegation and shared decision making that Strauss (1963) and others (e.g., Heller; Locke & Schweiger) have suggested.

Delegation and Leadership Research

This research also addressed aspects of several leadership theories, especially some largely untested aspects of Vroom and Yetton's model for individual decisions. First, the data supported Vroom and Jago's (1974) finding that managers tend to delegate less important decisions. Second, these data indicated that objective measures of subordinates' competence, and goal congruence between supervisors and subordinates influenced the effectiveness of delegation. Delegation was related to subordinates' performance, both directly and as a function of competence³ and goal congruence,

³ Subordinates' competence was similar to Vroom and Yetton's measure, subordinate information.

thus supporting Vroom and Yetton's (1973) contention that these attributes are important considerations in a normative model. Equally significant, this research examined these aspects of the model with a different methodology than Vroom and his colleagues have typically employed, using actual measures of delegated authority and objective indicators of performance instead of managers' reports of behavioral intentions and perceptual ratings of decision quality (cf. Jago & Vroom, 1980; Vroom & Jago, 1978). Thus, these results are arguably not directly applicable to Vroom and Yetton's model; a more useful observation, however, is that support for Vroom and Yetton's (1973) predictions does not seem to depend on specific methods, such as decision scenarios, or specific operational definitions of the relevant variables, such as perceptual descriptions.

These results also have implications for the vertical dyad linkage (VDL) theory of leadership. The data indicated that supervisors do indeed distinguish among subordinates in the amounts of latitude they delegate. Moreover, variability existed in subordinates' performance as a function of these differences in delegated authority. Thus, these data support the emphasis, found in both the VDL and Vroom-Yetton models, on variability rather than consistency in both leaders' behavior toward subordinates and subordinates' reactions to this differential treatment.

Future Research

Although this research provided opportunities to better understand delegation, it did not fully resolve several important issues. First, since the hypothesized predictors of delegation explained only a small percentage (13%) of the total variance in levels of delegated authority, the question of why some subordinates receive more authority than others seems not to have been adequately addressed. There may be several reasons for this. Some of the questionnaire measures may have been inadequate to test the predictions because the reliability of some scales, like supervisors' role perceptions, was low. In addition, the study did not test all possible predictors of delegation that previous research has suggested. Kerr and Jermier (1978), for example, proposed several factors that may act as substitutes for leadership, including workgroup cohesiveness, organizational formalization, and professional orientation of subordinates. Many of these substitutes may also be significant predictors of levels of delegated authority among subordinates and may provide useful direction for future research on delegation.

Second, delegation affected subordinates' performance both directly and in interaction with subordinates' competence and goal congruence. The hypotheses did not predict this significant direct effect. In addition, measuring competence in terms of previous performance may have somewhat inflated the significant interactive effect. Independent measures of competence such as licensing or training may better clarify the relationship between delegation and subordinates' performance.

Third, from a practical perspective, the efficacy of delegation as a form of time management warrants further investigation. Books and journals for

practitioners have long advocated delegation for effective time management, yet researchers have largely ignored this issue. The results reported here indicated that subordinates were delegated more decision making authority when their supervisors faced high volumes of work. Moreover, supervisors' workload was the only variable that was a significant predictor of potential differences among supervisors in the amounts of authority they delegated. Although the two other predictors based on supervisors, need for dominance and role perceptions, had only moderate to weak internal reliabilities, the results nonetheless suggest that situational constraints rather than personal predispositions account for any apparent consistency in supervisors' treatments of their subordinates regarding delegation.

A final important avenue for future research is examination of distinctions between delegation and other forms of subordinates' involvement in decision making. The results of this research concerning subordinates' performance and satisfaction conflicted with those typically found in research on participation. Moreover, many writers (Heller, 1976; Locke & Schweiger, 1979; Strauss, 1963) have suggested theoretical differences between delegation and participation. Although this research did not specifically focus on distinctions between the two processes, the results do suggest that delegation is not entirely congruent with participation in either its predictors or its consequences. Because previous researchers have placed joint decision making and delegation on the same continua of participative decision making styles (Bass & Valenzi, 1974; Heller, 1971; Tannenbaum & Schmidt, 1958; Vroom & Yetton, 1973), these potential differences between the two processes particularly deserve closer scrutiny.

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APPENDIX

Supervisors' role perceptions. Respondents were instructed to indicate their level of agreement with each statement by circling the appropriate number (7 = strongly agree, 1 = strongly disagree). Item 2 was reverse scored.

1. An effective claims supervisor is one who allows claims adjusters to make many important decisions by themselves.
2. A major part of being an effective claims supervisor is making most of the important decisions for claims adjusters.
3. The willingness to delegate authority is one of the most important characteristics of an effective claims supervisor.
4. An effective claims supervisor makes it his/her business to review all decisions made by his/her claims adjusters.

Supervisors' perceptions of subordinates. Items contained 15-centimeter lines anchored at each end by the descriptors listed. Respondents were instructed to place the initials of their subordinates on the lines according to how well each descriptor fit them. Items 1, 2, and 9 measured subordinates' capability, items 5, 6, and 7 measured responsibility, and items 3, 4, and 8 measured trustworthiness.

1. Understanding of job requirements: incomplete understanding-thorough understanding.
2. Job knowledge and skills: lacking in necessary job knowledge and skills-has all necessary job knowledge and skills.
3. Ability to work independently: requires close supervision-requires little supervision.
4. Shares organizational goals: often looks after his/her own interest-always places the company's interests first.
5. Willingness to take responsibility: unwilling-willing.
6. Initiative: works only on tasks assigned-self-starter.
7. Dependability: sometimes undependable-always dependable.
8. Trustworthiness: does not inspire trust-inspires trust.
9. General job competence: lacking competence-very competent.

Goal congruence. Respondents were instructed to rank-order these items according to their perceived importance in influencing how effectively adjusters settled claims: file documentation, policy holders' satisfaction, third-party claimants' satisfaction, fast settlement of claims, managing high volume of claims, low cost of claims, fast initial contact with claimants, fast follow-up after initial contact, sales agents' satisfaction.

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THINKING AND MANAGING: A VERBAL PROTOCOL ANALYSIS OF MANAGERIAL PROBLEM SOLVING

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While thinking aloud, 12 general managers from six corporations solved a short business case. Three college undergraduates performed the identical task. Content analyses of the verbal protocols suggested that the managers began planning courses of action relatively sooner, used more reasoning processes, and made fewer requests for specific information than did the students. Correlations with independent ratings of the effectiveness of action plans suggested that those managers who employed analogical reasoning and whose recommendations were specific generated better action plans than other managers. These findings are discussed in terms of a model of opportunistic thinking.

The cognitive processes that lead managers to understand the multitude of events, information, and other stimuli that continually confront them in their jobs are central to organizational and managerial behavior (Duhaime & Schwenk, 1985; Isenberg, 1984; Kiesler & Sproull, 1982; Sproull, 1984; Srivastva, 1983; Ungson, Braunstein, & Hall, 1981; Weick, 1979a, 1979b). Much of the recent research and theorizing on cognitive aspects of managerial work has focused on how managers impose meaning on the stimuli that they encounter (Ford & Hegarty, 1984; Ranson, Hinings, & Greenwood, 1980; Weick, 1979a, 1979b). According to this research, the interpretation of events or data is not intrinsic to stimuli, but rather is the result of managers fitting stimuli to their own beliefs, biases, and assumptions (Donaldson & Lorsch, 1983). Presumably, different managers with different sets of assumptions or interpretive schemes (Ranson et al.) would come to different understandings given identical objective stimuli to interpret. This prediction has been explored using clinical (Donaldson & Lorsch, 1983) and historical methods (Brief & Downey, 1983) and has been extensively studied in social psychological research (e.g., Snyder, 1981), but it has not yet received empirical confirmation in the managerial domain.

Closely related to how managers understand is the question of how practicing managers allocate attention. Sproull (1984) found that the attention spans of seven low-level managers were very short and broken by interruptions by others as well as by the managers themselves. Another finding,

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consistent with that of observational research on managerial behavior (e.g., Mintzberg, 1973), was that these managers primarily paid attention to orally communicated information that was not directly relevant to any particular decisions they were in the process of making (Sproull).

The literature on managerial understanding has helped alert researchers and managers alike to the fact that perceptions of organizational reality are fragmented, varied, and subject to pluralistic interpretations, thereby making communication and coordination in organizations problematic at times. Nevertheless, this literature has not generally been informative about the dynamic process of understanding. Instead, researchers have focused on static cognitive structures such as cause maps (Bougon, Weick, & Binkhorst, 1977), knowledge structures (Isenberg, 1982), interpretive schemes (Ranson et al., 1980), and implicit theories of organizing (Brief & Downey, 1983). For example, we do not understand the extent to which managers make inferences based on incomplete data, when in a problem-solving process they make those inferences, and whether the interpretive or inferential process varies from manager to manager. A major review of the literature likewise concluded that the cognitive processes underlying managerial information processing were little understood (Ungson et al., 1981:130). Schweiger, Anderson, and Locke (1985) made a parallel criticism of research on the cognitive processes underlying decision making, commenting that only a very limited understanding of decision making has been derived from the traditional input-output studies.

How managers attend to and interpret stimuli is only one important aspect of management. A manager's job requires action as well as understanding, and the cognitive processes that transform understanding into action are also critical to a comprehensive grasp of managerial behavior. Unfortunately, the cognitive processes that guide managers from understanding to behavior have received even less research attention than those that lead to understanding. In previous research (Isenberg, 1984, 1985, 1986a,b), the author presented an argument, based on field observations, that intuitive processes underlie managerial behavior in a number of ways. They appear to help managers get ideas about what to do and to help them perform routine, well-learned, behaviors. The author further observed that managerial understanding and action are intimately related and that managers engage in *thinking/acting cycles*, in which actions they take lacking complete understanding feed back to complete their comprehension. Weick (1983) similarly speculated that the actions managers perform embody managerial thinking and that action can be (1) more or less thoughtful, (2) provoked by thinking, and (3) intensified by thinking. Weick's delineation of "thoughtful action" (1983: 226-227) as careful, attentive, reflective, and purposeful, is consistent with Schon's (1983) argument that an essential element of skilled professional practice is a practitioner's ability to reflect on actions while performing them.

Like the data on managerial understanding, the data informing our current ideas about the cognitive underpinnings of managers' planning and

implementation of actions are generally based on indirect inference and speculation. One helpful source of information is the literature comparing the cognitive structures and processes used by experts and novices in a variety of complex tasks in such areas as chess (Chase & Simon, 1973), computer programming (Adelson, 1981), physics (Larkin, McDermott, Simon, & Simon, 1980), and accounting (Bouwman, 1984). These empirical studies¹ suggest that the extensive repertoires of experiences and solutions, organized hierarchically in their memories, and accessed more through recognition than through conscious search, underlie the performance of the experts (Simon, 1978a). When confronted with problems, experts use these experiential bases as well as the rules of inference they have learned to form representations of problems. Such representations are based on inferences that go beyond whatever meaning may be inherent in the actual facts of a problem. Whereas novices' representations of problems may be based on superficial features of situations, experts have learned to draw on such functional principles as chess strategies or physical laws.

Recent research on action planning and implementation in mundane settings (Hayes-Roth & Hayes-Roth, 1979; Wilensky, 1983) is another nonmanagerial source of ideas about the cognitive processes underlying action planning and implementation. Hayes-Roth and Hayes-Roth studied the think-aloud protocols of people attempting to run a large number of hypothetical errands in a fictitious town, given a map and a time limit. One of their major conclusions was that people are *opportunistic* in implementing their plans. Rather than defining and prioritizing goals, refining them into subgoals, and implementing plans in order of priority, subjects in these experiments frequently replanned in the midst of implementation in response to previously unforeseen opportunities that arose as they were running their errands. Furthermore, they often performed actions that were either of low priority or unrelated to any previously specified goal.

What cognitive process do managers use when they come to understand and solve business problems? This exploratory research project was designed to further our understanding of these processes. This study also investigated whether there is anything distinctive about the way managers think and what cognitive processes account for more and less effective managerial problem solving and action planning.

METHODS

Overview

Subjects were tape-recorded thinking aloud as they analyzed and solved a short business case. The tape recordings were then transcribed and the transcripts analyzed with a 17-category scheme containing codes for various cognitive processes. A research assistant abstracted action plans (case solutions) from the transcripts, and blind expert judges independently rated

¹ Chase and Chi (1981) and Glaser (1984) summarize the expert-novice literature.

these plans. Relationships between scored cognitive processes and both group membership and quality of action plans were explored.

Researchers studying cognitive phenomena (Ericsson & Simon, 1984) frequently use the think-aloud method, called *verbal protocol analysis*, and researchers in management-related disciplines have also employed it (Bouwman, 1982, 1984; Schweiger et al., 1985). Discussions of the methodological issues have also appeared (Ericsson & Simon, 1984; Payne, Braundstein, & Carroll, 1978; Ungson et al., 1981). Such issues include the accuracy and completeness of subjects' verbal reports (Nisbett & Wilson, 1977) and the obtrusiveness of the thinking-aloud process (Schweiger, 1983). In a comprehensive summary of the literature, Ericsson and Simon (1984) argued that verbal protocols are usually accurate and representative measures of cognitive processes, particularly when subjects are reporting memory traces that are already in verbal form before they begin the process of verbalizing about them. This condition was presumably met in this study, because individuals verbalized while reading and analyzing a written business case.

Subjects

Subjects were 12 general managers of divisions from six corporations in the United States and three Harvard-Radcliffe seniors interested in pursuing business careers.² The managers completed the think-aloud task in the context of a larger study of managerial thinking, during which they were observed over a period of several days, interviewed, and asked to think aloud while engaged in various managerial activities. Two managers per corporation participated; each had been nominated by at least one senior corporate executive. Three of the corporations were large (multibillion dollar) manufacturing companies, one was a medium-sized (\$250 million to \$1 billion) manufacturing company, and two were medium-sized service and telecommunications companies with negligible manufacturing. Division sizes ranged from \$3 million to \$1.5 billion. The general managers all had profit-loss responsibility for their divisions and had multiple functions reporting to them. The college students were solicited as part of a study on how people think. They were nominated—by individuals who were the equivalent of dormitory proctors—because they planned to pursue business careers.

² The focus of research was on general managers, and the three students were included as a comparison group. This small number decreases the power of any statistical comparisons as well as the generalizability of the results. There were two reasons for the small size of the group as a whole: (1) the high cost of transcribing and coding the protocols, which require approximately 15 person hours each, and (2) professional precedent. The cost of the protocol analysis has led all researchers using the technique to restrict sample sizes drastically. Thus, a group of 15, with three in the comparison group, is consistent with similar research in different fields and is even on the high side. Bouwman (1984) compared three expert C.P.A.'s with five novices; Adelson (1981) compared five expert computer programmers with five novices; Chase and Simon (1973) compared a total of three chess players of different levels with each other.

Procedures

All subjects were instructed that they were going to analyze and solve a standard business case chosen for its brevity (approximately 750 words) and for not requiring any particular body of technical knowledge for solution. They were also told that the case had been put onto seven randomly arranged cards in order to better simulate managerial reality, in which problems do not necessarily arise in any particular order. They were free to work on the case in any way they wanted, to rearrange the cards or leave them in the received order, and to use paper and pencil if they so wished (only one did). They were instructed to think aloud constantly, even though they were reading the cards, not to censor their thoughts, and to be unconcerned about grammar or about talking in complete sentences. The researcher then demonstrated the think-aloud procedure by multiplying two 2-digit numbers while thinking aloud.

The case used, the Dashman Company case (Harvard Business School Case Services, 1947), is a very short business case describing how Mr. Post, a new vice-president of purchasing for Dashman, has decided to centralize certain aspects of the purchasing process for the company's 20 plants in order to ensure adequate supplies of certain essential raw materials. Over the objections of his experienced assistant, Post sends out a letter describing a new purchasing process. He receives supportive letters from the 20 purchasing managers, along with total noncompliance with the new procedure. The research participants were asked to analyze what, if any, are the problems facing Mr. Post, and to spell out what, if anything, he should do.

Measures

Content categories. The transcripts of the think-aloud Dashman protocols were scored using a 17-category scheme that is reproduced in the Appendix. The coding categories reflect current research and theory about cognitive functioning in complex tasks (Sternberg, 1984, 1986). Of particular concern were how people (1) encoded the information by forming and instantiating concepts (categories 3-6), (2) reasoned from the encoded information in order to develop mental representations of the problem (categories 7-10, 12), and (3) planned action (categories 14-17). These categories were refined from in-depth, qualitative analyses of two trial protocols generated in a pilot study. The author and the research assistant took two transcribed protocols generated by nonparticipants and, taking one phrase at a time, studied each phrase in each protocol. They made a tentative categorization for every phrase and discussed each one in order to sharpen the operational definitions of the categories and to make the decision rules explicit.³ Two categories, 11 and 13, which were not suggested by previous research, were added as a result of these analyses.

A trained research assistant, blind to the identity of the subjects, parsed and coded all protocols. The author also scored a random sample of 10

³ The codebook is available from the author.

percent of all scored comments; these were stratified by content category because some categories had low frequencies. Agreement between the author and the assistant was 86 percent for the 72 comments. The two categories that were the source of most of the disagreements were subsequently combined into the information focus category.

Effectiveness of action plans. In order to derive an independent measure of the quality of the action plans, a research assistant abstracted an outlined plan from each protocol. This task involved very little judgment, since the managers clearly indicated when they were specifying or reiterating.⁴ A written outline of each plan was presented to three members of the faculty of the Harvard Business School, all of whom had taught the Dashman Company case dozens of times and had had extensive experience evaluating similar written action plans. Each of these experts rated each action plan on six 7-point scales: internal consistency, complexity, completeness, appropriateness of the sequencing of action steps, realism, and overall effectiveness. These scales are closely related to measures used by other researchers studying action planning (Streufert & Swezey, 1986). After making the six ratings for all 15 action plans, each expert rater ranked them in terms of quality. Raters were blind to subjects' identities. Since all of the six ratings, as well as the rankings, were positively intercorrelated, a composite scale was constructed representing the average of all of the seven scores for each action plan.⁵ Effective interrater reliability for the resulting composite scores was .75.⁶

RESULTS

Comparing Managers and Students

What is *managerial* about managerial problem solving? In order to statistically and quantitatively explore this question, the 12 general managers were compared to the three college students. Table 1 reports analyses as correlations, in order to facilitate comparing effect sizes. This information can be transformed into the *t*-statistics by the standard computational formula: $t = \text{square root } [r^2 \times df / (1 - r^2)]$ (Rosenthal, 1984).

Protocols varied from 767 words to 4,490 words in length, a factor of about 6, with the average being 1,910. Although the difference between students and managers was not significant, it was substantial enough to raise

⁴ For example, most subjects were as explicit as the manager who said, "One of the first things I would do would be to talk to ahh Mr. Manson. And I think I would also talk to—who was it, Larson? . . . I think I'd start with Larson and I'd ask him" This would be typed as: "step 1 —talk with Larson." If no other steps were considered, step 2 would be, "talk with Manson."

⁵ The composite equaled the sum of [(16 minus the effectiveness rankings) divided by 2] plus (the sum of the ratings on all of the six scales, summed across raters) and divided by 21, which is the number of variables multiplied by the number of raters. Raw scores were used since the standard deviations of the component ratings ranged from 1.01 to 1.08.

⁶ See Rosenthal and Rosnow (1984: 163–166) for a discussion of interrater reliability with multiple raters.

TABLE 1
Comparisons of Managers and Students Derived from Analyses of Protocols

Variables	Managers ^a		Students ^b		Difference Correlations ^c	
	Means	s.d.	Means	s.d.	Unweighted	Weighted
Length of protocol ^b	1659.30	1021.90	2913.67	1514.85	-.44	N.A.
Information focus	15.92	11.80	35.33	25.60	-.49**	-.19
Clarifies	1.67	3.03	2.00	2.65	-.05	.06
Evaluates ^d	63.08	48.43	117.67	151.41	-.30	.17
Specific to general	14.58	6.19	29.33	16.07	-.60**	.04
General to specific	0.42	0.90	0.67	1.15	-.11	.11
General to general	0.58	1.51	0.33	0.58	.08	.16
Causal reasoning	1.08	1.31	0.00	0.00	.36	.40
Conditional reasoning	6.83	3.86	6.00	4.36	.09	.53**
Analogical reasoning	1.42	1.38	1.00	1.00	.13	.30
Explicit inference	7.08	6.02	6.33	3.06	.06	.41
Sum of all reasoning categories	16.42	11.26	13.33	6.65	.12	.73***
Reflects on task ^d	55.50	65.31	378.33	273.09	-.75***	-.65***
Summarizes ^d	126.42	127.52	163.00	168.77	-.12	-.06
Empathizes ^d	44.58	59.64	24.67	42.72	.15	.25
Number of steps in plan	18.25	20.77	10.67	6.35	.17	N.A.
Number of contingencies in plan	2.08	2.19	0.33	0.58	.35	N.A.
Goal references	1.92	2.19	2.00	1.73	-.02	N.A.
Action plan begins (number of words elapsed)	58.46	15.72	79.00	4.14	N.A.	-.53**

^aN = 12

^bN = 3

^cManagers were coded as 1, students as 0. Therefore, a negative correlation indicates that students showed a particular variable (e.g., information focus) more than managers, and a positive correlation that managers showed more of a variable than students; N.A. = not applicable for conceptual reasons.

^dNumber of words.

^eNot significant when calculated as Spearman rank order correlation (see text).

* $p < .10$; all values for p reflect two-tailed tests, 13 df.

** $p < .05$

*** $p < .01$

the question as to whether or not protocol length would confound other differences. This is as much a conceptual as a statistical question, in that it involves the extent to which certain categories of thinking can be expected to vary directly as a result of number of words. Since there is no a priori way of deciding this issue for many variables, analyses of protocols both weighted and unweighted by length are reported when both make sense conceptually, and both kinds of results for most variables are treated as informative in the exploratory spirit of this research. Five of 31 differences between managers and students were statistically significant ($p < .10$, two-tailed tests).⁷

Perhaps the strongest and most coherent pattern in the findings fits both the stereotype and the emerging empirical picture of senior executives as people of action as opposed to analysis (Mintzberg, 1973). The managers commenced action planning sooner in their protocols than did the students ($p < .05$, weighted) and used fewer words reflecting on the task process ($p < .01$, weighted; $p < .05$, unweighted). For 7 of the 12 general managers, it was possible to identify a specific action seed or idea that they verbalized before explicitly beginning to plan courses of action. Six of these action seeds appeared less than one-third of the way through the total protocol; for all seven managers, an average of 26 percent of the protocol elapsed before they mentioned their first ideas for action. For the 12 managers, action planning appeared on the average 40 percent of the way through the protocol, either as an action seed or as the beginning of explicit action planning.

Also noteworthy was that managers showed more conditional reasoning than did the students ($p < .05$, weighted). When all reasoning categories were summed (causal, conditional, analogical, and explicit inference), it became evident that the managers reasoned more than did the students ($r = .73$, $p < .002$, weighted). On the other hand, the managers generalized less from specific facts than the students ($p < .05$, unweighted). Reasoning involves more explicit speculation and figuring out the meaning of facts ("I would have had the sense that I had made an error because . . . , but I have not received any such indication . . . so perhaps I was not in error"), whereas generalization involves categorizing based on a specific fact ("Mr. Larson is a liaison between Mr. Post and the rest of the company"). Consistent with this finding, the results for information focus show that managers asked less often for additional information than did the students ($p = .06$, unweighted); instead they interpreted and reasoned from the facts that were available in the case, usually in the order in which they were presented on the cards. Apparently, the inference processes that managers use when presented with uncertain or ambiguous information play a central role in their thinking processes (Bouwman, 1982, 1984).

Since only a small number of subjects participated in this research, the possibility of the data distribution's violating the assumptions of normality inherent in the use of parametric statistics was tested for those variables reported as statistically significant. The Kolomogorov-Smirnov statistic

⁷ The alpha level of $p < .10$ was used because the research was exploratory.

(SAS Institute, 1979) indicated that a number of the variables did in fact significantly depart from normality. For these variables, several different nonparametric statistics were calculated. In most cases, statistical significance was confirmed ($p < .05$). The exceptions (noted on Table 1) were all in the same direction and of approximately the same magnitude; they missed achieving significance in part due to the large amount of information ignored in nonparametric analyses. The Spearman rank-order coefficients for the equations were: generalizing from specific information (unweighted, $r = -.37$, $p = .18$), information focus (unweighted, $r = -.41$, $p = .13$), and reflection on task (weighted, $r = -.50$, $p = .06$).

Effectiveness of Action Plans

Although imperfect reliability probably attenuates relationships between the scored variables and composite effectiveness, a number of variables did significantly predict the effectiveness of action plans. Since the focus of this research was on managerial problem solving, the predictors of effectiveness were computed for the 12 managers only.⁸ Specifically, concretizing and instantiating from general information (general to specific) was significantly correlated with effectiveness ($p < .05$). The strongest predictor of an action plan's effectiveness was also a reasoning process, analogical reasoning ($p < .02$), or using personal experience to understand Mr. Post's situation. In addition, there was a tendency for the number of contingencies managers planned for to predict experts' ratings of the effectiveness of their action plans ($p < .10$). There was also an intriguing suggestion that those managers who focused more on the specific facts of the case ended up with action plans rated as less effective by the experts ($p < .10$, weighted).

DISCUSSION

To summarize this study's major findings, managers commenced action planning sooner than students; were less reflective about how they went about performing the case analysis; tended not to ask for additional specific information; and reasoned from, rather than categorized, the information. Effectiveness of a manager's action plan was predicted by their specifying and providing instances for general ideas, analyses, and plans; reasoning by analogy; focusing less attention on specific case facts; and having plans that considered some key contingencies, demonstrating conditional reasoning.

One of the more interesting findings concerns how the managers used the information that was sequentially presented to them in the Dashman case. Rather than collecting all of the available information, formulating a comprehensive analysis of Mr. Post's situation, and then devising a course of action, the managers frequently came up with ideas about what to do with

⁸ Snedecor and Cochran (1967: 193) specifically stated that parametric statistics may be used provided that one variable is normally distributed. In these analyses, therefore, since the composite rating of effectiveness was distributed normally, the product-moment correlations were considered sufficient.

TABLE 2
Correlations of Dependent Measures
with Effectiveness of Managers' Action Plans

Variables	Values of <i>r</i> (<i>df</i> = 10)	Values of <i>r</i> , Weighted (<i>df</i> = 10)
Length of protocol ^a	.39	N.A.
Information focus	-.12	-.55*
Clarifies	-.04	-.04
Evaluates ^a	-.09	-.20
Specific to general	.30	-.31
General to specific	.62**	.37
General to general	-.22	-.22
Causal reasoning	-.03	-.21
Conditional reasoning	.48	-.02
Analogical reasoning	.71**	.40
Explicit inference	.29	.21
Reflects on task ^a	-.14	-.30
Summarizes ^a	-.10	-.15
Empathizes ^a	.43	.28
Number of steps in plan	.42	N.A.
Number of contingencies in plan	.52*	N.A.
Goal references	.39	N.A.
Action plan begins (number of words elapsed)	.21	-.39

^aNumber of words; N.A. = not applicable for conceptual reasons.

**p* < .10, two-tailed test.

***p* < .05, two-tailed test.

neither complete information nor a thorough analysis. Qualitative analyses of the protocols revealed many instances in which managers judged Mr. Post, or reached conclusions about the case, after reading only three or four cards out of the seven. Furthermore, managers used their experience rather than additional case information to interpret quite heavily from the presented information. What is surprising is that the managers did all of these things with the full knowledge that complete information was available at no extra cost.

These observations are consistent with Simon's concepts of satisficing and search costs, with one important qualification. Managers did severely restrict their information searches. However, Simon predicted, or at least implied (Simon, 1978a, 1978b), that search will vary as a function of such costs as time, energy, attention, and money. It would be very difficult to argue that further search would have been at all costly for this study's subjects, since they knew that complete information was available to them by simply reading the additional cards.

The concept of opportunistic thinking (Hayes-Roth & Hayes-Roth, 1979) accounts more completely for the present observations. If people consider certain information both valuable and scarce, and its presence unpredictable, they can be expected to milk each piece of data for its maximum usefulness

in interpreting a situation by making speculative but plausible inferences based on limited data (Collins, 1978). Furthermore, under the assumption of opportunistic thinking, people will not expect answers to all of their factual questions; they will ask few questions like "How long has Mr. Post been in his position?" but rather will make do with the data at hand. Having interpreted or figured out the situation, they are then free to begin planning action relatively soon.

It is quite conceivable that managers learn to think opportunistically through their experience with the economics of information processing and search costs. Thus, a manager might begin planning action with the first appearance of a reasonable idea, having learned through experience to satiate, to take advantage of ideas that are good enough and that emerge before all of the data are in.

It is also plausible that an habitual awareness of search costs leads managers to reason much from small amounts of actual data. In other words, managers' opportunistic thinking leads them to use higher-order mental processes more often than inexperienced nonmanagers do. Furthermore, it is very likely that once managers are engaged in the process, they will act and plan action rather than continue to verbalize or to analyze situations in a pedestrian manner.

Interviews with the 12 general managers support this somewhat speculative argument. They reported that they believed information to be a precious commodity of which they should take maximum advantage. Although there were differing opinions about the amount of information that was ultimately available, they believed that they could neither expect nor afford complete information because of the scarcity of time and attention, and thus had to derive maximum benefit from the information at hand. However, given the paucity of such information, one could hypothesize that managers add value to the sparse facts through the use of inferential processes, speculations, hypothesis generation, what if scenarios, and the like.

This analysis and interpretation implies a need to better understand higher-order mental processes as used by senior managers. How are prior conceptions applied in any particular situation? How are these prior conceptions formed via experience? The finding that a higher-order reasoning process, reasoning by analogy (Duhaime & Schwenk, 1985), is the best predictor of the effectiveness of action plans underscores the need to address these questions. Finally, questions surrounding the obvious problems inherent in opportunistic thinking, such as local maximization and the possible inaccuracy of premature conclusions, need to be answered. Perhaps some managers have learned through experience to restrain their opportunism, or to temper opportunism by introducing strategic concerns. Further research should clarify to what extent, and how, managers both act and think opportunistically, yet remain within strategic frameworks.

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APPENDIX

Protocol Coding Scheme

1. Information focus. Requests, repeats, or ponders specific information, for example, "What kind of equipment?"
2. Clarifies. Clarifies the meaning of a particular fact, for example, "Why is it his first decision?"
3. Evaluates. Evaluates, for example, "That's crazy!"
4. Specific to general. Moves from specific to general, for example, "so Mr. Post sounds like some kind of consultant coming in from outside . . ."
5. General to specific. Moves from general to specific, for example, "Typical corporate problems now (generalization). Somebody up there is trying to make decisions without knowing what the real world is. Mr. Post has not met with . . . the persons . . . he might like to visit . . . he had so many things to do at the head office (specific case fact)."
6. General to general. Moves from general to general.
7. Causal reasoning. For example, "They didn't respond because . . ."
8. Conditional reasoning. For example, "If you don't depend on . . . people, then you can do what you want. But if you need them to give you inputs, you better make sure that they are lined up on your side."
9. Analogical reasoning. For example, "I don't know the particular problem yet, but I do know though from our company . . ."
10. Explicit inference. For example, "I would have the sense that I had made an error, because I got back a very nice letter that said that everybody was going to cooperate with me, but I have not received any indication that they are."
11. Reflects on task. Reflects on task process, for example, "The first thing I want to do is get a feel for how long everything is on the cards . . . so . . . the first thing I'm doing is to thumb through them all."
12. Summarizes. Summarizes to form a total picture, by tying together a number of case facts, inferences, evaluations, etc., clearly punctuating the analytic process.
13. Empathizes. For example, "If I was a person receiving this letter I would think . . ."
14. Number of steps in action plan.
15. Number of contingencies in action plan.
16. Goal references. Explicit reference to goals in action plan.
17. Action plan begins. The percentage of the protocol that precedes the first attempt at action planning.

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RESEARCH NOTES

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BOARD COMPOSITION AND THE COMMISSION OF ILLEGAL ACTS: AN INVESTIGATION OF *FORTUNE* 500 COMPANIES

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Corporate boardroom processes and board composition have long been topics of interest and debate for both organizational researchers and practitioners. In recent years, however, criticism of corporate boards has increased dramatically, as evidenced by the comments of former International Telephone & Telegraph chairman, Harold Geneen. According to Geneen, "the boards of directors of U.S. industry include numerous first-rate people doing what amounts to a second-rate job" (1984: 258). In defense of his position, he brought up many points, but board composition is the most central to his argument. Essentially, Geneen and other critics have argued that the designs of corporate boards restrict their members' independence and render them ineffective when it comes to monitoring top management and protecting stockholders' interests (Anshen, 1980; Drucker, 1973; Mace, 1971; Mintzberg, 1983).

The reform that critics of boardroom processes most frequently offer involves increased representation by outsiders, directors who are not members of management. According to these advocates, a higher proportion of outside members strengthens a board's independence and broadens its base of power and knowledge. What is perplexing, however, is that although accepted as common knowledge and adopted in the rules and regulations of various stock exchanges and government agencies, this position remains virtually untested. Thus, despite a clear trend in U.S. firms toward greater outside representation (Heidrick & Struggles, Inc. 1979, 1980; Herman, 1981; Korn/Ferry International, 1981; National Association of Corporate Directors, 1982; Securities and Exchange Commission, 1980; Smith, 1978; Vance, 1983), we still do not know if organizations with greater proportions of outsiders on their boards are more effective in terms of serving stockholders than those companies dominated by insiders.

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OUTSIDER DOMINANCE PERSPECTIVE

The name frequently given to this strategy for boardroom reform is the outsider dominance perspective. According to supporters of this position, outsiders should be in the majority on corporate boards, because they offer greater breadth of knowledge and experience (Bacon & Brown, 1973; Firstenberg & Malkiel, 1980; Securities and Exchange Commission, 1980; Williams & Shapiro, 1979). More important, advocates of this position consider outsiders a vital board resource because of two issues—independence, and the dual roles of many chief executive officers (CEOs) (Berg & Smith, 1978).

In over 75 percent of large U.S. firms, the CEO serves simultaneously as board chairman (Heidrick & Struggles, Inc. 1981; Korn/Ferry International, 1981; National Association of Corporate Directors, 1982). Yet, despite its prevalence, this arrangement has met with severe criticism for two reasons. First, it represents a conflict of interests. According to Geneen, "the board's responsibility is to sit in judgment on the management, especially on the performance of the chief executive, and to reward, punish, or replace the management as the board . . . sees fit" (1984: 252). The chief executive, on the other hand, is a professional manager. Geneen's point is that chairmen/CEOs cannot represent the shareholders in the first role and at the same time impartially sit in judgment on their own performance in the second role.

In agreement with Geneen is former Securities and Exchange Commission (SEC) chairman, Harold Williams. According to Williams, the chairman and CEO perform two very different roles. It is a CEO's job to speak on behalf of management, but it is a chairman's job to question management (Williams & Shapiro, 1979). Palmieri (1979) also agreed, noting that a board chairman should strive to create an environment where questioning and in-depth discussion are valued. A CEO, however, despite appreciating the board's function, wants to "get the meeting finished so the organization can get on with its business" (1979: 48).

A second problem brought on by unitary leadership is that it forces inside or management directors into an uncomfortable position. As noted, it is a board's responsibility to monitor management's performance. Consequently, insiders are being asked to evaluate the individual who on a day-to-day basis acts as their boss. Supporters of outsider dominance suggest that outside directors, because of their independence, can better serve the interests of stockholders. Unlike their inside counterparts, who are a CEO/chairman's subordinates, outsiders can freely evaluate management's performance and act to remedy inappropriate or unacceptable situations.

Strongly backed by advocates of boardroom reform, the notion of outsider dominance has received support from other sources as well. Beginning in the late 1960s, for example, both the New York Stock Exchange (NYSE) and American Stock Exchange (ASE) ruled that all firms listed on the exchanges must have a minimum of two outside board members (Securities and Exchange Commission, 1980).

Also during this time, Williams, then chairman of the SEC, actively promoted a more stringent proposal, suggesting that outsiders and CEOs be the sole members of boards (Firstenberg & Malkiel, 1980; Securities and Exchange Commission, 1980; Vance, 1983). Recently, there has been renewed interest in this proposal (Anshen, 1980; Geneen, 1984). Although never adopted as a rule by the SEC, Williams's idea did seem to have a profound effect on the composition of boards. A dramatic shift took place between 1970 and 1980 (Heidrick & Struggles, Inc., 1979, 1980; Herman, 1981; Korn/Ferry International, 1981; National Association of Corporate Directors, 1982; Securities and Exchange Commission, 1980; Smith, 1978; Vance, 1983). One report that surveyed 1,300 large firms found an increase in the percentage of outsider representation from 59.6 percent in 1971 to 65.9 percent in 1979, and in a 1981 update of the study, the percentage climbed to an even higher 72.2 percent (Heidrick & Struggles, Inc., 1979, 1981). In still another study examining 887 firms, 71 percent of the directors were outsiders (National Association of Corporate Directors, 1982).

In recent years, efforts to bolster the position of outsiders on corporate boards have continued. The stock exchanges and the SEC have adopted a number of new rules and regulations regarding board committees. For example, the SEC, NYSE, ASE, and National Association of Securities Dealers all advocate that outsiders should represent a significant portion of the membership of audit committees. In fact, the NYSE, which has the most stringent regulations of these groups, insists that all firms listed on the exchange must maintain an audit committee "comprised solely of directors independent of management and free from any relationship that . . . would interfere with the exercise of independent judgment" (National Association of Corporate Directors, 1982: 46).

The SEC appears to agree with the NYSE's position, noting that having an audit committee whose members have vested interests related to those of management may be worse than having no audit committee at all, because a firm thus creates the appearance of having an effective body, but it in fact lacks substance (Securities and Exchange Commission, 1980). According to these regulators, the sensitive nature of such a committee's monitoring tasks makes it unlikely that insiders can maintain the needed independence. The duties and responsibilities of other groups, such as compensation and nominating committees, also illustrate why many boards strive for, if not require, outside dominance on key committees.

RESEARCH HYPOTHESES

Although the outsider dominance perspective has been popular since the 1960s, and the subject of numerous rules and regulations, there has been surprisingly little empirical research on the topic. Of the few studies that have been conducted, virtually all have used the performance of firms as their dependent variable (Schmidt, 1975; Smith, 1978; Vance, 1955, 1964). Moreover, their findings have been mixed. In fact, in many of the studies,

high proportions of insiders, not outsiders, are associated with high levels of performance (e.g., Vance, 1955, 1965), and thus their conclusions oppose the outsider dominance perspective and prevailing business sentiment.

Although these findings may appear perplexing to some advocates of outsider dominance, others might question if these empirical studies have in fact captured the true question. After all, critics and supporters alike acknowledge that a board's role is to monitor and evaluate a firm and its top management. If directors affect the operations and performance of a company, it is only indirectly, through such acts as the hiring or firing of CEOs. Most advocates of boardroom reform readily acknowledge that it is not a board's responsibility to serve in an operating or functional capacity (Herman, 1981; Vance, 1983).

Issues of legality appear to be an area over which boards have more direct control and interest (Mueller, 1979). Thus, an important test of the outsider dominance perspective might be to examine the relationship between board composition and a firm's involvement in illegal activities. Since boards of directors are legally responsible (Committee on Corporate Laws, 1976), its members may be more likely to monitor their firm's actions to insure that management is not acting illegally than they are to monitor functional operations in general. Although directors might not know about a firm's involvement in illegal actions, ignorance of such matters places them in a very precarious, and possibly severely damaging, legal position.

This research question, which is substantially different from previous tests of the outsider dominance perspective, may help to clarify earlier findings. Rather than suggesting that outsiders strengthen firms through positive effects on certain outcome or dependent variables like overall performance, this study considers whether outsiders strengthen firms by preventing certain negative actions, specifically, illegal activities.

Hypothesis 1: There is an inverse relationship between the proportion of outsiders on its board and the number of illegal acts committed by a firm.

This first hypothesis suggests that although both insiders and outsiders might be aware of a firm's involvement, or planned involvement, in illegal actions, insiders, because of their subordinate position, are less likely to speak up against management and a CEO/chairman despite sharing legal accountability. Outsiders, who do not work daily under the CEO, may be more likely to bring such actions to the attention of other board members and to object to the firm's planned or actual involvement.

Although Hypothesis 1 addresses the direct relationship between the proportion of outsiders and a firm's involvement in illegal actions, it does not consider a simple majority effect. The key issue may not be the number or percentage of outsiders, but whether outside directors represent a minority or a majority. In the first case, the outsiders may choose to remain silent, not voicing concerns over the legality of certain actions or questioning the CEO; in the second, they might be more willing to speak up.

Hypothesis 2: Firms with a majority of outsiders on their boards will engage in fewer illegal acts than those firms with a majority of insiders on their boards.

These two hypotheses address the basic relationship between board structure and illegal acts, but neither considers the possibility of a causal lag, whereby earlier illegal acts have led to changes in board structure. After a firm's involvement in illegal acts, its board as a whole may seek to strengthen outside representation in an effort to improve its monitoring function and enhance stockholders' confidence. Altering a group's composition is a means to reassure various regulatory agencies and key constituents that a board intends to make changes so that this type of involvement will no longer be tolerated. Even if no actual modifications of the roles, responsibilities, and conduct of board members occur, a change in composition can serve as a symbolic action, signaling that the board will no longer condone such activities; in some respects such a change resembles the ritual scapegoating often described in the literature on executive succession (Brown, 1982; Eitzen & Yetman, 1972; Gamson & Scotch, 1964; Lieberman & O'Connor, 1972; Pfeffer & Salancik, 1978). This notion that board composition and corporate illegal activities may be causally linked suggests that:

Hypothesis 3: The greater a firm's involvement in illegal activities, the more likely it is to increase the proportion of outside directors on its board.

Finally, given earlier arguments concerning the conflict of interests that might result when CEOs simultaneously serve as board chairmen, we suggest:

Hypothesis 4: Firms with a single individual serving in the roles of CEO and chairman are more likely to commit illegal acts than firms with two separate individuals serving in these roles.

RESEARCH DESIGN

The objective of this research was to test the relationship between board composition and the occurrence of illegal corporate acts. The population we used included all companies continuously listed on the Fortune 500 between the years 1980 and 1984 ($N = 384$). Most firms that were dropped from that list during this period were objects of corporate mergers and acquisitions. Staw and Sz wajkowski (1975) provided information about types of illegal activities committed by these firms and *Trade Cases* (Commerce Clearing House, Inc., 1980–84) provided information concerning involvement in legally questionable activities. This publication reports decisions and consent and litigation decrees entered in federal and state courts for cases involving possible violations of antitrust laws and the Federal Trade Commission Act.

As did Staw and Sz wajkowski (1975), we considered these areas of litigation: price discrimination, tying arrangements, refusal to deal, exclusive dealing, franchise violation, price fixing, foreclosure of entry, reciprocity, allocation of markets, monopoly, conspiracy, and illegal mergers and

acquisitions. We also used the same criteria, with the dependent variable represented by the total number of instances in which firms were found guilty in litigated cases, were parties to nonlitigated consent decrees, or involved in unsettled cases in which the court found substantial merit to the charges against the cited firms.

Our classification of board members as insiders or outsiders also followed previous research (Pfeffer, 1972; Schmidt, 1975; Vance, 1964). We considered current or retired managers of an organization or of one of its subsidiaries to be inside directors. Outside directors did not currently hold, nor had they previously held, management positions within the company for which they were serving as director. Consulting *Standard & Poor's Register of Corporations* (1981–85), which lists directors either as members of management or outsiders, we divided the numbers of outside members by the total numbers of directors to obtain a proportion for each firm. However, because these data are longitudinal, and slight changes in board composition are common from year to year, it was necessary to average percentages of outsiders from 1980 to 1984.¹ Thus, the proportion of outsiders represents the average proportion for each firm during the five years under investigation. For Hypothesis 2, the independent variable is binary, so we used a dummy variable, with firms having a majority (> 50%) of outsiders on their boards coded 1, and firms where outsiders were a minority coded 0 (Schmidt, 1975).

Finally, to test Hypothesis 4, we needed to distinguish firms with a single individual serving as both CEO and chairman from those firms in which separate individuals held these positions. Once again, the relevant information was in *Standard & Poor's Register of Corporations* (1981–85). We compared names and titles to determine whether there was dual or separate leadership between 1980 and 1984. As might be expected, changes took place over time, with firms going from separate to dual leadership, or vice versa. Thus, in an effort to remain as conservative as possible, we used for further analysis only those firms that consistently maintained either dual or separate status throughout the relevant dates ($N=274$).

RESULTS

For the companies in our population, the average number of directors between 1980 and 1984 ranged from a high of 40 to a low of 5 ($\bar{x} = 13$). The proportion of outsiders to total directors ranged from a high of 100 to a low of 12 percent, with the mean at 70 percent. The last figure is similar to earlier estimates regarding percentages of outsiders (Heidrick & Struggles, Inc., 1981; Korn/Ferry International, 1981; National Association of Corporate Directors, 1982). The numbers of illegal acts over the period ranged from a high of 17 to a low of 0. Although the mean for all firms was less than 1 (0.90), the mean for those firms that were involved in some type of illegal activity was 3. The numbers of firms with consistent dual and separate leadership

¹ We divided the proportion for each year by the number of years.

throughout the period were 245 and 29, respectively. Thus, for those firms that maintained a consistent leadership status, 89 percent had single individuals serving in the roles of CEO and chairman, a figure consistent with earlier findings (Heidrick & Struggles, Inc., 1981; National Association of Corporate Directors, 1982).

Results offered no support for Hypothesis 1. The proportion of outsiders was not significantly related to the number of illegal acts ($r = -.012$, n.s.). Similarly, the results of a one-way analysis of variance indicated no significant relationship consistent with Hypothesis 2 ($F = .07$, n.s.). Firms with a majority of outsiders were not involved in fewer illegal acts than those represented by a majority of insiders.

After these initial analyses, we considered two additional variables, organizational size and governmental regulation, either of which could have a substantial effect on the relationship under investigation. For example, some industries, such as defense, broadcasting, and oil and gas, are subject to greater regulation than others; this may, in turn, influence the number of illegal acts in which they are involved. We use partial correlation to control for size, measured in terms of firms' assets, and governmental regulation of industries defined as high or low, depending on the number of federal agencies monitoring the activities of the industry. Despite this additional control, the overall results remained the same ($r = -.010$, n.s.).

Although no significant relationship was found when illegal acts were assessed in the aggregate over time, it is possible, as Hypothesis 3 suggests, that previous commission of illegal acts may have lead to changes in the structures of boards. In particular, the boards of firms that have been exposed to prosecution for illegal acts may recruit more outsiders to improve monitoring and enhance stockholders' confidence. To test this causal lag, we divided the years under examination into two equal periods—1980 to the second quarter of 1982, and the third quarter of 1982 to 1984—and calculated both the numbers of illegal acts and the percentages of outsiders on boards of directors for each subperiod. We then modeled the possible causal determinants of board structure as a series of regression equations.

TABLE 1
Correlations Between Proportion of Outside Directors
and Number of Illegal Acts^a

	Proportion of Outside Directors	Majority of Outside Directors	Number of Illegal Acts
Proportion of outside directors	—	.650***	-.012
Majority of outside directors		—	.013

^a $N = 384$

* $p < .05$

** $p < .01$

*** $p < .001$

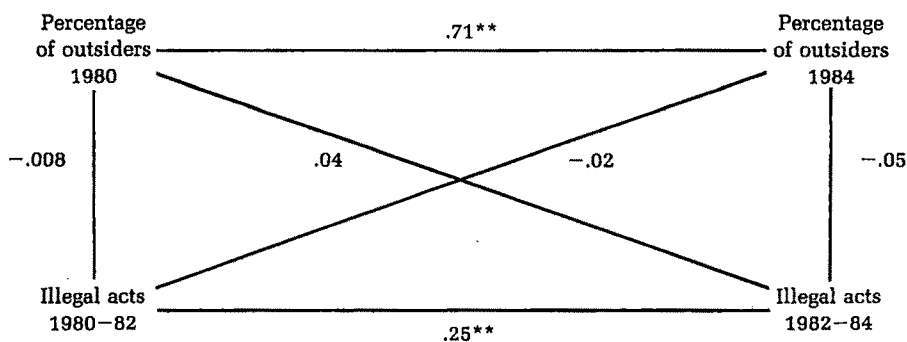
Figure 1 displays the results of these analyses, and Table 2 presents the detailed results of the regression equations. The findings indicate that both board structure and the commission of illegal acts were consistent over time. No support emerged for the proposition that commission of illegal acts leads to changes in the structures of boards, either directly or indirectly. Similarly, there is no evidence that board structure directly or indirectly leads to the commission of illegal acts.

Finally, one-way analysis of variance was used to test Hypothesis 4. The results indicate that firms where one individual serves as both CEO and chairman are no more likely to be associated with illegal acts than those firms in which separate individuals hold these positions ($F = 1.82$, n.s.).

DISCUSSION

The results of this investigation are important for several reasons. First, this work adds to the existing research, much of which has failed to support the outsider dominance perspective (Schmidt, 1975; Vance, 1955, 1964). The findings of this study do not suggest that adding outsiders to corporate boards will lessen a firm's involvement in illegal activities. Similarly, there is no evidence that firms dominated by outsiders are more likely to engage in illegal acts. In addition, this study represents a novel test of the outsider

FIGURE 1
Board Composition and Illegal Acts,
Cross-Lagged Panel Analysis^a



^aIllegal acts 1980-82 refers to the number of illegal acts between the first quarter of 1980 and the second quarter of 1982. Illegal acts 1982-84 refers to the number of illegal acts between the third quarter of 1982 and the fourth quarter of 1984. Values on paths are standardized coefficients (β 's).

* $p < .05$

** $p < .01$

TABLE 2
Results of Regression Analysis
of Determinants of Illegal Acts and Board Composition

Independent Variables	Percentage of Outsiders, 1984		Numbers of Illegal Acts			
	β	t	1980		1984	
			β	t	β	t
Percentages of outsiders						
1980	.680	19.80**	-.006	-.16	.13	.21
1984					-.49	-.75
Numbers of illegal acts						
1980	.003	.97			.19	5.10**
1984	.003	-.75				
R^2		.51	.0001		.06	
F		131.18	.03		8.67	

* $p < .05$

** $p < .01$

dominance perspective. Previous examinations of this issue have focused on the relationship between board composition and performance, addressing the question of whether outsiders have a positive effect on firms by strengthening positive outcomes. This study, however, approached the issue from a different perspective, asking if outsiders help to minimize or prevent certain negative outcomes. Taken together, the results of these two types of studies lead us to question whether the objectives of outsider dominance, or conceptual arguments for this strategy, are legitimate. The evidence to date does not seem to support the belief that stockholders are better served by boards dominated by outsiders.

For the most part, the outsider dominance perspective has remained unchallenged since its conception over 20 years ago. Moreover, given the recent and rather dramatic increase in criticism of corporate boards, it has been the basis of a highly recommended strategy for improving poor boardroom processes and enhancing stockholder representation. This study, however, raises questions as to whether this method of reform reaches desired ends.

In the future, researchers may want to investigate what types of boardroom reforms will improve corporate performance and reduce firms' involvement in illegal activities. These reforms might include placing greater attention on such background characteristics of directors as their experience and education, or focusing on their financial involvement in a company, such as stock ownership. Still other research efforts might examine the roles of board committees in efforts to improve the monitoring function of directors and reduce involvement in illegal actions. In sum, despite the popularity of the idea of outsider dominance and its adoption as the basis of certain rules and

regulations of various government agencies and stock exchanges like the SEC, NYSE, and ASE, the findings of this and prior studies suggest that we should reexamine this approach to boardroom reform.

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TECHNOLOGY, SIZE, AND ORGANIZATIONAL STRUCTURE: A REEXAMINATION OF THE OKAYAMA STUDY DATA

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In the organizational literature, technology and size have long been studied as determinants of organizational structure. In recent years, the relationships between technology, size, and structure have been among the important research issues investigated (Carter, 1984; Dewar & Hage, 1978; Dewar & Simet, 1981; Fry, 1982). Recently, the Okayama study (Marsh & Mannari, 1981) renewed the debate about the structural effects of technology versus size, drawing on data from 50 Japanese factories. Their findings showed that size affected only two of the domains of structure they studied—structural differentiation and formalization—more than technology did. Technology affected all the other aspects of structure—labor inputs, cybernetic complexity, costs and wages, differentiation of management from ownership, span of control of chief executive, and union recognition—more than size did. Marsh and Mannari suggested that these results gave a new lease on life to the technological imperative.

This study, a reanalysis of the data from the Okayama study, was an attempt to develop and clarify its areas of methodological ambiguity. The Okayama study used multiple measures for several of the dependent and independent variables. However, the analysis procedure employed in the study—separate disaggregated regression equations for single measures of dependent and independent variables—precluded taking full advantage of the availability of multiple measures of constructs. Bagozzi and Philips (1982) demonstrated how the use of latent-variable structural models with multiple measures permits the study of construct validity of measures, measurement errors in variables, and causal relationships between latent theoretical variables. Such a methodology is superior to traditional methods of testing hypotheses because it leads to accurate conclusions about a theory and the correspondence between constructs and their measures. Using latent-variable structural models, I investigated the construct validity of the independent and dependent variables from the Okayama study, examined the fit to the data of the model implicitly assumed in that study—the Aston model (Pugh, Hickson, Hinings, & Turner, 1968, 1969)—and compared the results with

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Marsh and Mannari's findings.¹ Using a structural model with multiple measures of technology reduces problems due to specification errors in estimating the effects of size and technology on structure, because both measures of technology are employed simultaneously and modeling of measurement error is explicit (Bagozzi, 1980: 96).

CONSTRUCT VALIDITY AND SPECIFICATION ERROR

The Okayama study had multiple measures for several dependent and independent variables, but Marsh and Mannari did not explore the construct validity of these measures. The only criterion used in the study seems to be face validity (Stone, 1978: 54–55). In general, the use of multiple measures of variables is quite useful, because it is possible to see if they converge (Webb, Campbell, Schwartz, & Seechrest, 1966; Webb & Weick, 1979). Rather than empirically examining the convergent and discriminant validity of the multiple measures, Marsh and Mannari implicitly assumed that the measures were valid indicators of their respective underlying constructs. It is possible to determine empirically if these multiple measures have convergent and discriminant validity (Bagozzi & Philips, 1982). Additionally, using latent-variable structural models with multiple measures allows explicit modeling of measurement errors in variables, simultaneous use of multiple measures of constructs, and provides estimates of hypothesized relationships between these constructs. Disaggregated regressions, which do not take measurement errors into account, may be misleading and are therefore weaker tests. Also, because they do not correct causal parameters for measurement error, they may fail to detect causal paths that are present.

Marsh and Mannari treated their two measures of technology, automaticity and the Khandwalla technology measure, somewhat differently than the disaggregated regressions they used for their multiple measures. They included the "automaticity or Khandwalla technology score, which has the greater effect on the dependent variable" (1981: 40) in the regression equation as an independent variable affecting structure.² The magnitude of the correlation between automaticity and the Khandwalla measure of technology is 0.37 (Marsh & Mannari, 1981: 39); size is also correlated with both of these technology measures. This causes a potentially serious problem of specification error. Excluding either of the two technology measures in each regression equation causes two other problems: (1) it biases the regression coefficients of both size and the included technology measure, and (2) it biases estimates of standard errors upward so that the tests of significance become unduly conservative (Rao, 1971). These specification error problems

¹ Aldrich (1972) suggested a different model of the relationships between technology, size, and structure. In the Aldrich model, technology is causally prior to structure and size, and structure is causally prior to size. Since the causal orderings of the variables for these two models are different, and only cross-sectional data were available, it is not possible to determine which model fit the data better, so this study did not address the issue.

² For more detailed information on the Khandwalla technology measure, refer to Khandwalla (1976).

would not have been as serious if the two technology measures were uncorrelated with each other and with size, the other independent variable. The fact that all are interrelated means that all the regression coefficients for the effects of size and technology (Marsh & Mannari, 1981: 41) on structure could be biased, and the significance levels of coefficients could also be understated. Employing structural models with multiple measures solves this problem since both measures of technology are used simultaneously.

METHODS

The basic data for this study consisted of the correlation coefficients between the variables and the means and standard deviations reported in the Okayama study (Marsh & Mannari, 1981: 39). Table 1 reproduces these data. Variables 1-3 are measures of size and technology, variables 4-8 are measures of the control variables, and variables 9-25 are measures of various dimensions of structure, the dependent construct. Given the size of the sample, the correlations among variables, and the means and standard deviations, it is possible both to assess the construct validity of measures and to estimate the parameters of the structural models by means of a maximum likelihood procedure, LISREL VI (Jöreskog & Sörbom, 1983).

Construct Validity

The extent to which an observed variable measures the underlying construct it purports to measure is called construct validity. Campbell and Fiske (1959) suggested two main criteria for construct validity—convergent validity and discriminant validity. The first is the extent to which multiple measures of a construct agree with each other. Failure to find high covariation between such multiple measures of a construct indicates either that the measures are poor or that the construct and the measures do not correspond (Bagozzi, 1981; Bagozzi & Philips, 1982). Convergent validity can be assessed by the confirmatory factor analysis model:

$$y = \Lambda \tau + \epsilon \quad (1)$$

and

$$\Sigma = \Lambda \Phi \Lambda' + \Psi. \quad (2)$$

Equation 1 simply states, in line with classical test theory (Lord & Novick, 1968), that the observed variables y are functions of the underlying construct τ and some random measurement error ϵ . The symbol Λ represents a matrix of factor loadings relating observed variables to the underlying constructs. In Equation 2, Σ is a matrix of the variances and covariances among the observed variables, Φ is a matrix of intercorrelations among the underlying constructs, and Ψ is a matrix of error variances in measures. Equations 1 and 2 together imply the null hypothesis of convergent validity.

TABLE 1
Correlations, Means, and Standard Deviations for All Variables in Japanese Factory Sample^a

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Means	s.d.
1. Natural log of size	34	59	25	-14	-10	-07	02	64	11	92	29	-22	35	-14	00	-01	-12	07	03	24	17	79	23	12	5.7	1.0
2. Automaticity	37	51	28	-19	-17	24	17	-06	33	07	-48	38	26	09	34	-47	17	01	49	-26	28	46	35	5.1	2.0	
3. Khandwalla technology measure		33	07	-12	01	06	25	16	59	19	-42	54	-07	07	12	-26	38	03	38	17	65	33	18	27.1	8.2	
4. Internal dependence		-03	-42	24	39	00	-31	14	06	-38	46	-18	05	14	-09	39	21	47	-18	22	55	24	3.5	2.8		
5. External dependence		-10	-27	-10	-16	13	-09	-07	00	12	08	-11	-06	-28	-17	20	17	-20	16	08	-09	3.9	1.7			
6. Autonomy		-22	-33	-10	22	-07	-02	11	-39	33	-05	11	04	17	-76	-16	11	-06	-26	-08	15.7	7.5				
7. Age of company		07	-09	15	-16	13	13	02	-19	-09	-10	44	20	20	09	12	01	11	26	31.7	20.1					
8. Number of company sites		04	-06	-02	-13	-08	43	-26	-31	03	-10	35	26	-08	05	-01	26	11	17.6	49.6						
9. Number of departments		07	68	36	-10	17	-24	13	08	-33	21	-04	-01	02	47	02	24	4.3	3.9							
10. Number of hierarchical levels																										
11. Complexity									29	20	-05	13	-06	-06	20	15	-03	-24	-29	07	09	-08	05	7.1	1.9	
12. Functional specialization									37	-25	27	-09	02	11	-18	09	-12	18	14	70	23	19	146.0	195.0		
13. Direct production workers									-36	04	37	35	01	01	20	-11	22	25	19	36	24	11.1	4.6			
14. Indirect production workers									-65	-53	-60	-28	44	-41	03	-45	20	-29	-47	-35	61.2	16.3				
15. Supervisors									-05	-04	-06	-30	09	31	22	03	47	29	26	16.6	11.7					
16. Clerical workers									39	12	-22	08	-27	24	-07	-11	21	23	7.8	5.9						
17. Percentage of university graduates									23	-21	53	15	27	-34	-06	19	14	14.1	7.9							
18. Percentage of labor costs									-26	27	-37	21	-36	03	30	24	5.9	4.7								
19. Percentage of wages to nonproduction employees									-36	-01	-13	20	-29	-11	-10	16.7	14.0									
20. Centralization									-30	24	-16	46	24	16	25.8	13.1										
21. Owner-manager differentiation									08	-05	-00	13	-10	133.4	29.4											
22. Foreman's span of control									-09	24	49	39	1.5	0.5												
23. Chief executive's span of control									03	-14	-07	13.3	8.1													
24. Formalization									22	13	11.3	19.8														
25. Union recognition									41	14.0	4.3															
												2.3	1.1													

^a N = 50; adapted from Marsh and Mannari (1981: 39); decimal points omitted from correlation coefficients.

If the chi-square value for the model is not significant, I can accept the hypothesis that the variation in observed variables is due to their relationship with the underlying constructs and random error. Figure 1 shows the baseline model used to test for convergent validity. Each construct with multiple measures is modeled separately. The λ 's give the factor loadings, the ϵ 's are measurement errors, and the ϕ_{ij} 's are the true correlations among the constructs.

Discriminant validity is the extent to which observed measures of different constructs are distinct from each other. One way to examine the discriminant validity is by constraining the ϕ_{ij} 's in Figure 1 to unity. A difference in chi-squares between the convergent validity model and this model that is larger than the critical value ($p < .05$) would support the constructs' discriminant validity (Bagozzi & Phillips, 1982; Jöreskog, 1971).

Structural Models

Figure 2 summarizes the Aston model of the relationships between technology, size, and structure. The dependent construct, structure, is composed of eight conceptually distinct dimensions—structural differentiation, labor inputs, knowledge complexity, costs and wages, authority, span of control, formalization, and union-management relations. Each one of these dimensions of structure is modeled separately. For simplicity, Figure 2 shows the structural model corresponding to only one dimension of structure, structural differentiation.

Since structure is the only endogenous variable, this is a one-equation model:³

$$\eta_1 = \gamma_{11}\xi_1 + \gamma_{12}\xi_2 + \zeta_1.$$

LISREL VI (Jöreskog & Sörbom, 1983), a general maximum likelihood estimation procedure, was used to analyze the measurement and structural models. It can estimate the unknown parameters of a system of linear structural equations. Following the usual structural equation modeling notation, the structural equations are:

$$\eta = \beta \eta + \Gamma \xi + \zeta;$$

and the measurement equations are given by

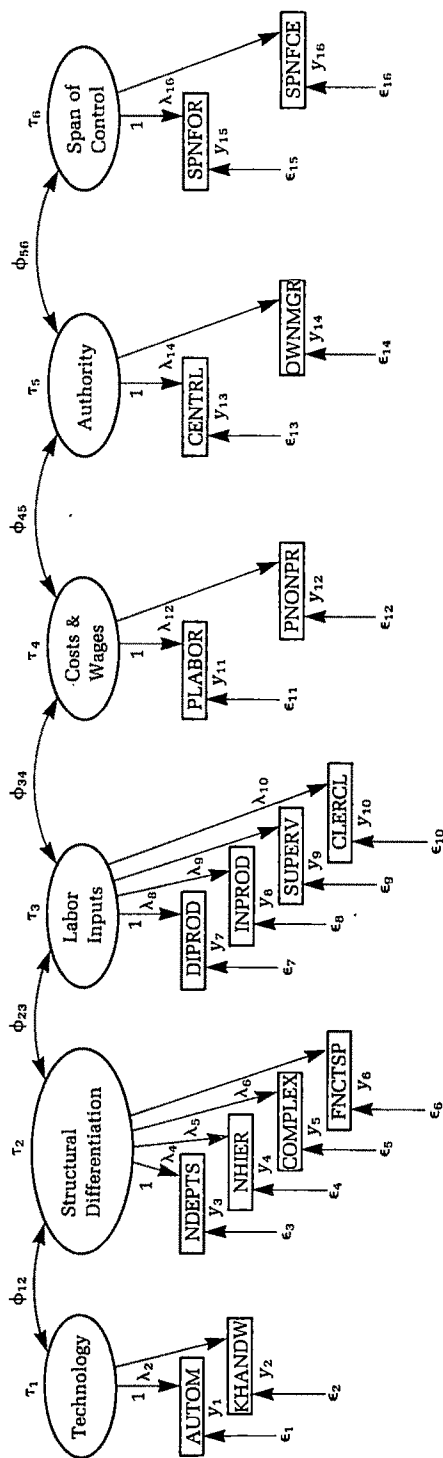
$$y = \Lambda_y \eta + \epsilon,$$

$$x = \Lambda_x \xi + \delta.$$

With this procedure, which provides standard errors for the estimates of parameters, a critical ratio (estimate/standard error) greater than 2.0 is normally taken to be significantly different from 0 (Jöreskog & Sörbom, 1983: III-12). The overall fit of the model to the data is tested by a chi-square goodness-of-fit test, with smaller chi-square values corresponding to better fits. This tests a model against the alternative that the variables are arbitrarily correlated. A value for p greater than 0.10 is usually taken to

³ The regression equation Marsh and Mannari used (1981: 40) is of the form of the equation for the Aston model, which indicates that that model is implicit in the Okayama study.

FIGURE 1
Measurement Model: Convergent Validity^a



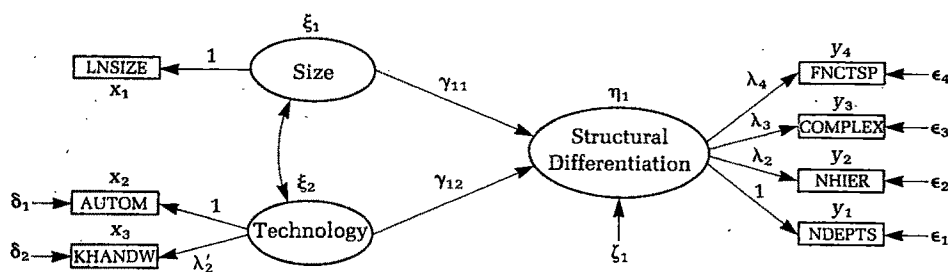
AUTOM = Automaticity measure of technology
 KHANDW = Khandwalla measure of technology
 NDEPTS = Number of departments
 NHIER = Number of hierarchical levels
 COMPLEX = Complexity
 FNCTSP = Functional specialization
 DIPROD = Direct production workers
 INPROD = Indirect production workers

SUPERV = Supervisors
 CLERCL = Clerical workers
 PLABOR = Percentage of labor costs
 PNONPR = Percentage of nonproduction employees
 CENTRL = Centralization
 DWNMGR = Owner-manager differentiation
 SPNFOR = Foreman's span of control
 SPNFCE = Chief executive's span of control

^a For simplicity's sake, not all ϕ_{ij} are drawn in this figure.

FIGURE 2
Multiple Indicator Latent Variable Model

ASTON MODEL



Symbols:

ξ = latent exogenous variables

x = measures, exogenous variables

λ' = factor loadings, exogenous variables

δ = measurement errors, exogenous variables

η = latent endogenous variables

y = measures, endogenous variables

λ = factor loadings, endogenous variables

ϵ = measurement errors, endogenous variables

γ, β = causal paths

LNSIZE = Natural logarithm of size

AUTOM = Automaticity measure of technology

KHANDW = Khandwalla measure of technology

FNCTSP = Functional specialization

COMPLEX = Complexity

NHIER = Number of hierarchical levels

NDEPTS = Number of departments

indicate that a model adequately fits the data (Bagozzi & Phillips, 1982; Jöreskog & Sörbom, 1983).

RESULTS

Measurement Models

This reanalysis began with tests of the construct validity of the observed measures of constructs. The first step of this process was to examine convergent validity by testing the fit of the model shown here in Figure 1. In case this model did not fit the data, the next step was to test all possible five-factor models, all four-factor models, all three-factor models, and finally, all two-factor models. The results of all these tests indicated which selected combinations of factors needed to be examined further for discriminant validity. For all the six-, five-, and four-factor models, either a solution could

not be obtained because the input data matrix was not positive definite, or, if the model converged to a solution, it did not fit the data adequately. Thus, for these models, I rejected the hypothesis that all variation in measures was due to the underlying constructs and measurement error. Since the size of the sample was relatively small ($n = 50$), it was unlikely that large sample size was responsible for rejection of this hypothesis (Bagozzi & Phillips, 1982; Bentler & Bonett, 1980). Of the three-factor measurement models, only three fit the data adequately according to the chi-square values. However, a closer examination of the estimates revealed that in all three models, some estimated correlations between latent constructs were greater than 1.0. Such improper solutions indicate that a model does not fit the data (Jöreskog & Sörbom, 1983: 1-36) and is fundamentally wrong. Thus, none of the three-factor measurement models had convergent validity.

Of the two-factor measurement models, seven fit the data adequately, and the remaining models did not. But two of these seven had improper solutions. Therefore, I rejected the hypothesis of convergent validity for these two models.⁴ It was appropriate to test the remaining five models for discriminant validity, and Table 2 summarizes the results of these tests.

The results of the chi-square difference test between the convergent validity model and a restricted model with the correlation between constructs constrained to unity showed that only two models achieved discriminant validity. One model was composed of the constructs for technology and structural differentiation, and the other had the constructs, structural differentiation and costs and wages. Although the second model had convergent and discriminant validity, incorporating it into further analysis was problematic, since it did not include the independent variable, technology. Thus the only constructs I modeled using latent variables with multiple measures

TABLE 2
Measurement Models: Discriminant Validity

Discriminant Validity Model ^a	χ^2	<i>p</i>	χ^2 Convergent Validity Model	<i>p</i>	Difference in χ^2 ^b	<i>p</i>
Technology, structural differentiation	27.68	.004	7.47	.680	20.21	<.01
Technology, authority	0.24	.994	0.04	.998	0.20	n.s.
Structural differentiation, costs and wages	36.80	.000	12.67	.243	24.13	<.01
Costs and wages, authority	2.55	.636	1.24	.744	1.31	n.s.
Authority, span of control	4.59	.332	3.43	.331	1.16	n.s.

^a ϕ_{12} is constrained to be 1.

^b $df = 1$.

⁴ In addition, considering the large number of measurement models tested, some models would fit the data by chance alone. This observation further strengthens the conclusion that the construct validity of the measures used in the Okayama study is quite poor, since the bias is in the direction of concluding the measures have convergent validity, when, in fact, they do not.

were technology and structural differentiation. All other variables were modeled with single measures of constructs.

As a final check, I examined the possibility that the measurement model for technology and structural differentiation provided a good fit to the data just because of small sample size, since the chi-square test statistic is a direct function of size of sample. Calculation of the incremental fit index (Bentler & Bonett, 1980), a measure of the practical significance of a model's explaining data, showed that this model explained about 91 percent of the variation in the measures. This two-factor model did appear to fit the data adequately, since values above a criterion level of 0.90 for the incremental fit index are acceptable (Bagozzi & Phillips, 1982).

To summarize, the confirmatory factor analyses for the measurement models showed that the baseline model did not have convergent validity. A comprehensive series of tests of all other possible measurement models showed that only two 2-factor models achieved convergent and discriminant validity. But since one of the models did not include technology, a theoretically important independent variable, it was not meaningful to pursue it further. Therefore, only the structural models for the technology and structural differentiation constructs were initially tested. Later, I analyzed structural models with single measures of constructs for the remaining variables.

Structural Models

Multiple measures of structure. Next I examined the fit of the Aston model to the data and compared the findings with the results of Marsh and Mannari's original study. This comparison was also intended to determine if the use of latent-variable structural models with multiple measures would lead to different results for the Aston model than disaggregated regressions. The Aston structural model with multiple measures yielded $\chi^2_{14} = 17.21$, $p = 0.245$, and the incremental fit index was 0.906, indicating an adequate fit of the model to the data. The revised Aston model with correlated errors yielded $\chi^2_{12} = 8.81$, $p = 0.719$, and the incremental fit index was 0.952.⁵ Table 3 reports the standardized estimates of causal parameters and factor loadings that relate measures to constructs for the Aston model. Also reported are the error variances and covariances.

Overall, the Aston model fit the data adequately. For this model, size had a significant positive effect on structural differentiation, but technology did not affect that construct. This finding was similar to the findings of the Okayama study. However, the Khandwalla technology measure explained

⁵ Bagozzi pointed out that correlated errors are one way to account for systematic errors that contaminate the conceptual and empirical meanings of theoretical terms (1984: 24-26). Since correlated errors were modeled within the structural differentiation construct, previously found to be unidimensional, it seems likely that the measures share a common method bias. However, the magnitudes of correlated errors are small (one is even not significant), they do not dramatically alter the estimates of parameters, and only two correlated errors are modeled. Thus, systematic errors are not a serious problem here. If these conditions were not met, correlated errors would seriously weaken the meaning and interpretation of the model.

TABLE 3
Standardized Parameter Estimates:
Multiple Measures of Structural Differentiation^a

Parameters	Aston Model	Parameters	Aston Model
γ_{11}	0.835*	ϵ_{11}	0.537*
γ_{12}	0.117	ϵ_{22}	0.982*
λ_2	0.132	ϵ_{33}	0.002
λ_3	1.000*	ϵ_{44}	0.881*
λ_4	0.345*	ϵ_{21}	-0.011
λ'_2	0.793*	ϵ_{32}	0.158*
ϕ_{12}	0.744*	δ_{11}	0.773*
ζ_1	0.143*	δ_{22}	0.378

^a Correlated errors were: $\text{COV } \epsilon_2 \epsilon_1$, $\text{COV } \epsilon_3 \epsilon_2$.

* Parameter estimate was at least two times the standard error in the unstandardized solution. All other estimates have critical ratios < 2.0.

about 40 percent more variance in the technology construct than it did in Marsh and Mannari's study (1981: 53), and it appeared to be a better measure of technology than they deemed it to be. These results suggested that the use of disaggregated regressions in the Okayama study led to the erroneous conclusion that the automaticity measure of technology was more appropriate than the Khandwalla measure. The reanalyses showed that the opposite was true. Since the model estimated here corrected for specification errors by (1) explicitly modeling measurement errors and (2) simultaneously considering both measures of technology (Bagozzi, 1980: 96), these results should be more accurate than the original study's results.

The control variables—internal dependence, external dependence, autonomy, age of company, and number of company sites—are not incorporated in the results reported here. To improve accuracy, I tested the models again, explicitly modeling the effects of the control variables. However, the model ran into severe problems with starting values, since the program did not converge for the starting values that were automatically generated. A variety of starting value inputs were tried, but no convergent solution was obtained. One possible explanation of this problem is that the model is not consistent with the data (Jöreskog & Sörbom, 1983). Since the overall models did not fit the data, it was not meaningful to examine the parameter estimates further.

Single measures of structure. Because the construct validity of the other dimensions of structure could not be established, none of the other models with multiple measures of structural dimensions could be tested. However, another option was to model each structural variable separately, with the assumption that each measured its underlying construct perfectly, without any measurement error. This, of course, was an implicit assumption in the Okayama study. The results of this set of analyses, which are not reported here for the sake of brevity, show that none of the models fit the data adequately. These findings provide a rather dramatic departure from Marsh and Mannari's major conclusion, that measures of labor inputs, cybernetic

complexity, costs and wages, differentiation of management from ownership, span of control of chief executive, and union recognition vary more with technology than with size. The main differentiating features of the current analysis were (1) the simultaneous incorporation of both technology measures, and (2) explicit modeling of measurement errors in the technology measures. The results indicate that taking these factors into account leads to null findings for the Aston model. Thus, it cannot be concluded from these data that technology is a better predictor than size for most aspects of structure.

DISCUSSION

The purpose of my reanalysis of the Okayama study's data was to address some methodological ambiguities in the original study. Despite the availability of multiple measures of structural dimensions and technology, Marsh and Mannari did not examine the construct validity of the measures. This reanalysis tested the construct validity of the measures and yielded more precise and accurate estimates of causal parameters by simultaneously using multiple measures of constructs and by incorporating measurement errors in the variables. The findings point to several conclusions, some of which cast specific doubts on the Okayama study's findings and also offer some general implications for organizational research.

Overall, the measures of variables did not exhibit construct validity, with the exception of the measures of technology and structural differentiation. This demonstrates, in part, the appropriateness of the view expressed in the literature (Stanfield, 1976) that a major source of confusion about the relationship between technology and structure is inadequate attention to the conceptual domains of the constructs. "Unrationalized categorizing" (Stanfield, 1976: 489), or lack of explicit and substantial explanation for conceptual groupings, can lead to apparently contradictory and sometimes noncomparable findings across studies. One important implication of these findings is that it is inappropriate to place unrealistically wide boundaries on the concept of organizational structure and to consider dimensions as diverse as costs and wages, structural differentiation, owner-management differentiation, and labor inputs to be aspects of structure. Future studies should attempt to be more precise about this concept. Theorizing about specific structural dimensions, rather than structure as a monolithic construct, would be a useful beginning.

An examination of the fit of the Aston model of the relationships between technology, size, and structure showed that only the model for structural differentiation fit the data adequately. Models for all other structural variables did not fit. The findings of this reanalysis rather clearly provide no support for the Okayama study's proffered new lease on life for the technological imperative. The current findings also indicate that the Khandwalla technology measure consistently explains more variance in the technology construct than the automaticity measure. The appropriate way to compare the measures is to model them simultaneously, not singly. This finding about

the Khandwalla technology measure was also contrary to the Okayama study's findings.

The general implications of this study for organizational research are mainly methodological. One that echoes earlier assertions in the literature (Webb et al., 1966; Webb & Weick, 1979) is that it is very useful and informative to study multiple measures of constructs and to establish construct validity. This process helps to rule out poor measurement as a possible confound in testing a theory. A second suggestion is that, where multiple measures of constructs are available, a relatively new and sophisticated methodology (Bagozzi & Philips, 1982) can be used to model causal relationships between latent variables with multiple observed measures and the relationships between measures and constructs. This methodology provides a sounder basis for testing theories and leads to more accurate estimates of causal parameters than other methods that have been in widespread use.

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COMPARING BELIEFS OF LINE AND TECHNOSTRUCTURE MANAGERS

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Do managers who work in different parts of the same organization express similar work-related beliefs, or different ones? Similar beliefs might form as a result of managerial practices that emphasize consensus and conformity. On the other hand, different beliefs might emerge if work roles mold work-related beliefs because these roles could differ substantially in different segments of an organization. Related research has shown that members who work in different segments of an organization exhibit different perceptions (Browne & Golembiewski, 1974; Dearborn & Simon, 1958), make different attributions (Sonnenfeld, 1981), and use different cognitive orientations (Kochan, Cummings, & Huber, 1976; Lawrence & Lorsch, 1967).

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In order to investigate possible differences in beliefs, researchers need to specify a meaningful basis for locating members in organizational space. Past research defined organizational space in terms of occupations or functional departments like sales or R&D (Dearborn & Simon, 1958; Kochan et al., 1976; Lawrence & Lorsch, 1967). In contrast, this project used Mintzberg's (1979) framework, which classifies organizational space into "five basic parts": operating core, technostructure, middle line, support staff, and strategic apex (1979: 11). Technostructures and middle lines engage in interminable conflicts with each other (Browne & Golembiewski, 1974; Dalton, 1950). A technostructure develops methods that standardize an organization's core work, whereas a middle line directly or indirectly supervises those people who perform the core work. By designing work processes, specifying outputs, or controlling workers' skills, technostructures remove some discretion and power from middle-line managers (Mintzberg, 1979; Pfeffer & Salancik, 1978). In this sense, functional specialists from such diverse fields as industrial engineering, financial control, production planning, quality assurance, and employee training are all members of one organizational part that develops and enforces standardization—the technostructure.

Middle lines also contain a diverse array of managerial jobs at hierarchical levels equivalent to some managerial jobs in technostructures. Researchers normally treat manufacturing and sales as distinctly different areas, yet Mintzberg lumped these two together into one midlevel organizational sector.

This study compared the beliefs of middle-line managers and technostructure managers to determine whether they are similar or different.

METHODS

Data were collected from managers in a relatively old and large company, which began operations over 70 years ago and now employs more than 10,000 people in several plants and offices throughout the United States, with corporate headquarters in the Midwest. Its heavily mechanized technical systems produce standardized products of low to moderate complexity. Markets for some of its products have remained stable, but a few markets have become stagnant.

Procedures

Working independently, three professors of organization theory classified jobs as being in the firm's technostructure, middle line, or some other part. Each read Mintzberg's (1979: 26–31) definitions and illustrations before beginning the task and used official organization charts that indicated job titles, reporting relationships, departmental names, and so forth. All three professors classified nearly all of the jobs identically; those few jobs that did not elicit complete agreement were not included in the study.

The distributions of technostructure and middle-line jobs by organizational level were similar. The top level contained 5 technostructure jobs and

8 middle-line jobs; the second level contained 12 and 11 jobs, respectively; the third level, 4 and 11; and the fourth level, 2 and 4. I did not investigate managerial jobs below the fourth level. The most frequent job titles in the technostructure included production control manager, manufacturing engineering manager, controller, and quality control manager. The middle line's most frequent job titles included manufacturing manager or superintendent, sales manager, plant manager, and regional sales manager.

All of these managers were men; they averaged 46 years of age; had spent an average 17 years with the company, with five years in their current jobs; and earned an average \$57,900 in base salary, expressed in 1985 dollars. On the basis of *t*-tests, technostructure managers did not differ significantly from line managers in terms of their average years in a job, years with the company, or base salaries. Line managers were somewhat older than technostructure managers (\bar{x} = 47.0 vs. 43.3, t = 1.77, p < .10). Conversations with several individuals from personnel revealed that most reassignments of managers involved moving up within their functional specialties. For instance, manufacturing-oriented supervisors moved up to such middle-line jobs as plant manager, not over to staff jobs like finance controller. Reassignments between staff and line jobs were unusual in this company; the technostructure and the middle line apparently operated as separate internal labor markets.

Data were collected between 1974 and 1975 in the context of a study of a goal-setting program (Nystrom, 1977). The corporate personnel department announced its cooperation with this study to relevant employees. Respondents mailed questionnaires, marked with identification numbers rather than names, to my office, thus ensuring confidentiality. Of 200 managers initially contacted, 68 percent participated; the current study focused on a subset of 57 individuals employed as managers in the firm's technostructure (n = 23) or middle line (n = 34).

Measures

Normative beliefs about the structuring of activities were measured by 20 items expressed on 5-point formats (Fleishman, 1957). Respondents were asked to indicate what they "sincerely believe to be the desirable way to act," and high scale points indicated strong beliefs in structuring the activities of self and subordinates. For instance, on the item "emphasize meeting of deadlines," 4 equals a great deal and 0 equals not at all. Scores on the 20-item scale ranged from 33 to 75. Table 1 presents means and standard deviations; Cronbach's alpha was .81. In other studies, this scale has also demonstrated adequate reliabilities (Fleishman, 1957) in terms of split-half internal consistency (r = .78 to .88) and test-retest reliability over three months (r = .74).

A 29-item questionnaire that elicits forced-choice responses measured causal beliefs about control of reinforcements (Rotter, 1966). For instance, one item asked respondents to choose either "Becoming a success is a matter of hard work; luck has little or nothing to do with it" or "Getting a good job

depends mainly on being in the right place at the right time." Low scorers, or internals, believe that people's behaviors closely match the reinforcements they receive; high scorers, or externals, believe that behaviors only loosely match such reinforcements (Lefcourt, 1976). Scores ranged from 0 to 11 in this study ($\alpha = .75$). In other studies (Rotter, 1966), this scale has demonstrated split-half internal consistency ($r = .65$ to $.79$) and test-retest reliability over one or two months ($r = .49$ to $.83$).

Motivation to manage was measured with procedures developed by Miner (1978). Employees complete sentences that begin with phrases such as "Getting ahead . . ." For this study, I used three of the original seven subscales, selecting those that have demonstrated high validity coefficients in the past (Miner, 1965: 87). Each has five stems. The authority figures subscale includes federal judges, top management, my father, my family doctor, and policemen. The competitive situations subscale includes getting ahead, arguing for a point of view, final examinations, running for political office, and being interviewed for a job. The imposing wishes subscale includes giving orders, conducting a meeting, punishing children, when one of my men asks me for advice, and getting other people to do what I want. Ten managers failed to return the motivation questionnaire. A response indicating a desire to perform the required role is scored as +1, a neutral response as 0, and an aversion as -1, so total scores could range from -15 to +15, and observed scores ranged from -5 to +5. Total scores on this scale have demonstrated (Miner, 1965) adequate test-retest reliabilities over ten weeks ($r = .68$ to $.84$); in this study, the reliability was somewhat lower ($r = .54$) for a random sample of 20 managers retested two months later. Miner (1965: 139-140), noting that subscale scores were less reliable than total scores for this scale, recommended placing major reliance on the second. Although I used the total score, the scale was a 15-item subset of Miner's 35 items, which may partially explain the lower reliability observed in this study.

The means and standard deviations reported in Table 1 closely resemble those found by other studies of managers. Relevant norms for belief in structuring (Fleishman, 1969) include 68 executives ($\bar{x} = 50.6$, $s.d. = 7.0$) and 493

TABLE 1
Correlations Among Variables^a

Variables	Means	s.d.	1	2	3
1. Belief in structuring	47.2	7.3			
2. Control of reinforcements	4.6	2.9	-.24		
3. Motivation to manage	1.3	2.3	.10	-.25	
4. Salary (\$000)	57.9	16.1	-.19	.06	-.14
5. Age	45.5	7.8	-.14	.12	-.01
6. Years in job	5.2	4.0	-.05	.12	.01
7. Years with company	16.7	8.1	-.05	-.25	-.11

^aN = 57, but 47 for variable 3.

middle managers ($\bar{x} = 49.7$, *s.d.* = 5.9). Results from a study of 24 top managers (Miller, Kets de Vries, & Toulouse, 1982) show a typical pattern: lower scores on locus of control for managers ($\bar{x} = 5.5$, *s.d.* = 3.2) than for the general population. Finally, results from the three motivational subscale scores for this study (authority figures, $\bar{x} = .82$, *s.d.* = .01; competitive situations, $\bar{x} = -.67$, *s.d.* = .01; imposing wishes, $\bar{x} = .91$, *s.d.* = .01) exhibit a pattern similar to norms reported by Miner (1965) for 160 corporate managers.

RESULTS

Analysis of covariance (ANCOVA) was used to test whether line managers' beliefs differed significantly from those of technostructure managers, after the effects of four covariates—salary, age, years in a job, and years with the company—had been statistically removed. Results in Table 2 for the main effect indicate that middle-line managers do differ significantly from technostructure managers in terms of all three beliefs, even after removal of the potential effects of these covariates. Moreover, none of the four covariates are associated with differences in beliefs about either structuring of activities or motivation to manage. Only for control beliefs do any covariates exhibit significance.

Multiple classification analysis yielded mean scores for beliefs of middle-line managers and technostructure managers, after I adjusted for the effects of the four covariates. Middle-line managers exhibited significantly more belief in the desirability of structuring people's work activities than technostructure managers ($\bar{x} = 50.1$ vs. 42.9), significantly more belief in internal control of reinforcements, as reflected by lower control scores ($\bar{x} = 4.1$ vs. 5.4), and significantly higher motivation to manage ($\bar{x} = 1.9$ vs. 0.3).

DISCUSSION AND CONCLUSIONS

The results clearly indicate that equivalent managers in different parts of the organization under study held significantly different beliefs about work-related topics. These results seem robust for several reasons: (1) three different sets of beliefs were studied, (2) the measures of beliefs used had already demonstrated both reliability and validity, and (3) these managers' beliefs closely resembled norms obtained from other groups of managers studied elsewhere.

Two implications flow from these results. One concerns conflicts between line and staff. An oft-cited study (Dalton, 1950) attributed such conflicts primarily to differences between the two in age, status, and promotional opportunities. But even after sampling and statistical manipulation to control for the possible effects of factors such as length of tenure, age, and salary, the differences in beliefs remained. Differences in beliefs probably do create and amplify intraorganizational conflicts; however, these differences apparently do not stem from demographic factors like those discussed by Dalton.

A second implication concerns the possible causes of role differences in managers' beliefs. Several processes may combine to produce associations

TABLE 2
Results of Analysis of Covariance

Sources	Dependent Variables								
	Structuring			Control			Motivation		
	df	MS	F	df	MS	F	df	MS	F
Covariates									
Salary	1	73.7	1.69	1	1.5	0.22	1	5.41	1.11
Age	1	21.2	0.49	1	30.9	4.39**	1	3.61	0.74
Years in job	1	0.4	0.01	1	4.1	0.59	1	0.04	0.01
Years with company	1	8.3	0.19	1	81.8	11.64***	1	4.36	0.89
Main Effect									
Middle line vs. technostructure	1	629.9	14.47***	1	20.6	2.93*	1	28.49	5.82**
Error	51	43.5		51	7.0		41	7.79	

* $p < .10$

** $p < .05$

*** $p < .01$

between work roles and work-related beliefs (Nystrom, 1981). Job requirements to perform certain tasks repeatedly and role expectations communicated by other organizational members (Roos & Starke, 1981) probably mold beliefs. Institutions that prepare people for new work roles also shape the beliefs that these new employees import into an organization (Sproull, 1981; Van Maanen & Barley, 1984). People's beliefs often influence their choices of careers and jobs. Moreover, an organization's beliefs often influence hiring and promotion; its recruitment practices and reward criteria sometimes filter out those whose beliefs seem incompatible with the prevailing beliefs of top managers (Nystrom & Starbuck, 1984). Finally, when people act upon their beliefs, they sometimes become more committed to them (Kiesler, 1971; Salancik, 1977). All of these processes would yield associations between work roles and work-related beliefs.

Group processes would further strengthen the associations between work roles and beliefs. When people communicate ideas, these ideas may be transformed into shared beliefs. Workgroup members exert pressures for conformity with their shared beliefs (Kilmann, Saxton, & Serpa, 1985). Collective actions taken by a group cumulate into shared beliefs that construct realities (Berger & Luckmann, 1966) that people in other groups within the same organization may not share. Over time, groups that interact infrequently or antagonistically can evolve substantially different beliefs.

An organization's structural features often define group boundaries, which influence members' attitudes and behaviors (March & Simon, 1958). In the past, researchers have focused on boundaries defined by small workgroups, by occupations, or by departmental affiliations. However, this study found differences in managers' beliefs associated with much broader boundaries, those delineating two major parts of an organization.

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EFFECTS OF ORGANIZATIONAL FORMALIZATION ON ALIENATION AMONG PROFESSIONALS AND NONPROFESSIONALS

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The role played by professionals in formal organizations has attracted the attention of several researchers in the fields of organizational behavior and organizational theory (Jauch, Osborn, & Terpening, 1980; Klimoski & Hayes, 1980; Organ & Greene, 1981; Weiner & Vardi, 1980). One major focus of research on this topic concerns the effects that organizational structures and processes have on the attitudes and behaviors of professionals. Among the most intriguing of these studies is one reported by Organ and Greene (1981). These researchers were interested in examining the effects of organizational formalization on the alienation expressed by scientists and engineers. They found that even though organizational formalization did not directly influence alienation, it had indirect influences through effects on role conflict, role ambiguity, and organizational identification. Surprisingly, however, these indirect influences were not completely additive. Formalization's net effect was to reduce alienation, but this resulted from an interplay of effects: formalization reduced role ambiguity and subsequently enhanced organizational identification, which tended to offset its effect of decreasing identification by inducing role conflict.

Organ and Greene (1981) explained their results through a compensatory process model, in which organizational formalization exerts complex and opposing effects on alienation. More specifically, this model suggests that although formalization of standard practices and policies is likely to activate role conflict among professionals because of the discrepancies that often exist between their norms and an organization's, it also reduces role ambiguity and increases organizational identification. These findings are important in that they suggest that the overall effect of organizational formalization on professionals' attitudes is not necessarily detrimental and may, in fact, be constructive. These findings also indicate that organizational formalization may have complex, and in some cases conflicting, effects on components of role stress and alienation.

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The purpose of the present study was twofold. Its primary objective was to examine Organ and Greene's model among a different group of professionals. They studied scientists and engineers; we studied a broad range of professionals, including medical doctors, lawyers, and architects. A secondary objective was to determine if the compensatory effects of formalization on alienation that Organ and Greene observed are limited to professionals, or if they also prevail among nonprofessionals. Thus, this study also included a population of nonprofessionals.

METHODS

Populations

The data for this study were collected from three different populations in the context of a larger research project designed to examine the effects of employees' perceptions of organizational characteristics on their attitudes and behaviors. The first population consisted of 104 pharmacy technicians from three hospitals in a midwestern city. The second consisted of 372 government employees in a western state, and the third consisted of 239 employees from a midwestern state's department of mental health.

Classifying the respondents from the three populations into professional and nonprofessional subgroups was accomplished in three steps.¹ First, we split the total population of 715 into three subgroups—professionals, nonprofessionals, and a mixed group—on the basis of job titles. Medical doctors, lawyers, engineers, and architects formed the professional subgroup, and clerical workers, pharmacy technicians, janitors, and road maintenance workers formed the nonprofessional subgroup. Second, all respondents whose educational background was not consistent with their classification, such as professionals with less than four years of college or nonprofessionals with more than four years of college, were put into the mixed group. Finally, we added all respondents whose professional orientation scores² were not appropriate to their category to the mixed group. Professionals below the median on this measure and nonprofessionals above the median were thus reassigned. We identified 88 professionals and 168 nonprofessionals using this procedure, and classified the remaining 459 respondents as in the mixed group.³ Since

¹ We are indebted to the editor for suggesting the procedure which was used to classify respondents into the professional and nonprofessional subpopulations.

² The professional orientation score is discussed further under Measures.

³ Although it is somewhat disquieting that two-thirds of the original population fell into the mixed group, two points regarding the categorization procedure should be noted. First, it is an extremely conservative procedure designed to ensure that no coding errors or marginal cases would confound or attenuate any possible differences between the professional and nonprofessional subgroups. Considering the procedure's stringency, as described in the text, it is not surprising that so many respondents fell into the mixed category. Second, the results for the mixed group (not reported owing to space limitations) did not differ substantially from those for the professional and nonprofessional subpopulations. Moreover, results were also not substantially different when we categorized respondents using only their professional orientation scores—a much less conservative method.

we felt that including the mixed group with either of the other two subgroups would confound results, those data were not included in the analysis.

Measures

Respondents' perceptions of *organizational formalization* were measured with Kerr and Jermier's (1978) 9-item scale. Consistent with House and Rizzo's (1972) measure of formalization, which Organ and Greene used, this scale assesses the extent to which an organization has explicitly formalized its standard practices, job descriptions, and policies. We measured *role conflict and ambiguity* with six and seven items, respectively, from the original 29-item Rizzo, House, and Lirtzman (1970) role conflict and ambiguity scales. We chose these items because of the stability across samples they have shown (Schuler, Aldag, & Brief, 1977). *Organizational identification or commitment* was measured with the 15-item Organizational Commitment Questionnaire developed by Porter, Steers, Mowday, and Boulian (1974). This scale, which measures the strength of an individual's identification and involvement with an employing organization, is conceptually similar to the scale of organizational identification Organ and Greene used. The 5-item scale developed by Miller (1967) and employed by Organ and Greene measured *employees' alienation*, the degree of estrangement from their work that individuals experience. Finally, we used the 3-item *professional orientation* scale from Kerr and Jermier's (1981) Substitutes for Leadership Questionnaire to compare the professionals and nonprofessionals; responses on this scale were not, however, included in the structural equations. All of these scales employed 7-point formats anchored from 1, strongly disagree, to 7, strongly agree.

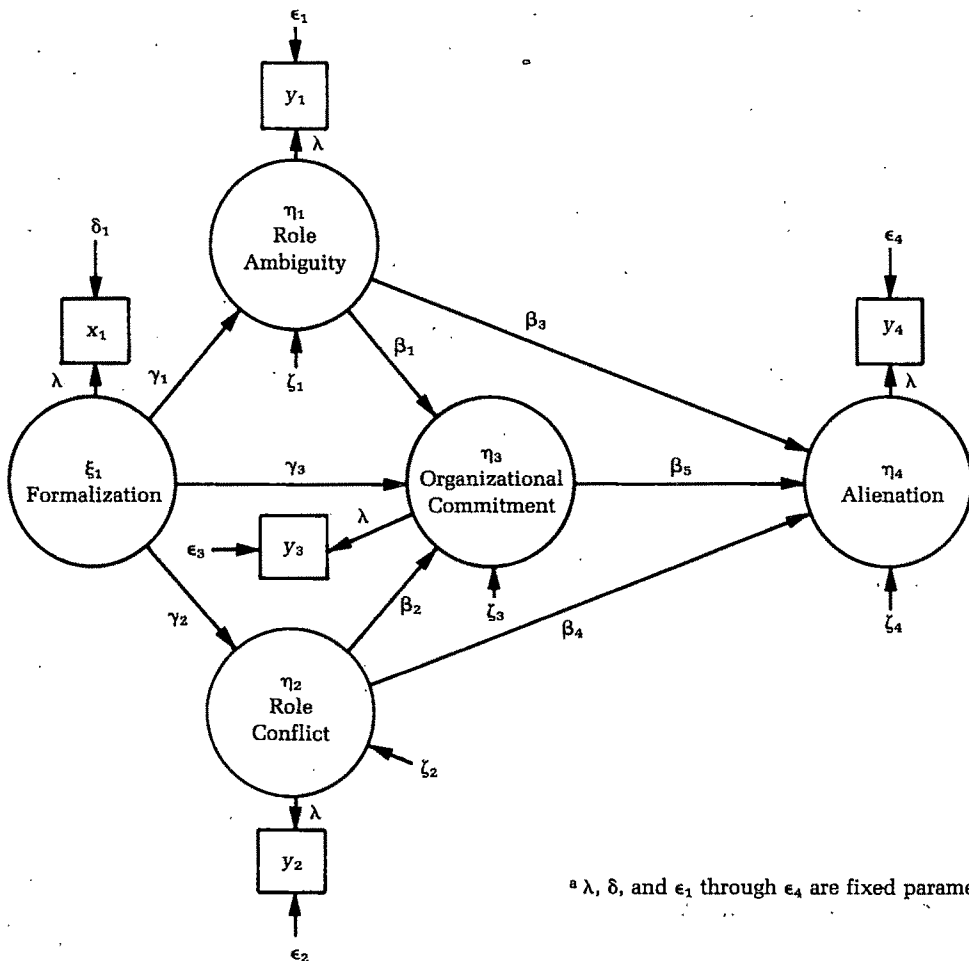
Analytical Procedures

Structural equation modeling was used to examine the generalizability of the Organ-Greene model, which Figure 1 represents graphically. This figure shows both structural and measurement components. The structural component specifies the causal relationships between the theoretical constructs, which are represented by circles (ξ , η_1 – η_4). Within this component, γ 's represent the effects of the exogenous construct, formalization, on three of the endogenous constructs, role ambiguity, role conflict, and organizational commitment, and β 's represent the causal relationships between endogenous constructs. The residuals for the endogenous constructs are indicated by ζ 's. We estimated these three groups of parameters during the model evaluation. The measurement component specifies the relationship between the constructs and the indicators used to measure them, which are represented in Figure 1 by boxes (x , y_1 – y_4). The Appendix further describes this component.

Using (1) covariance matrices, (2) the reliabilities from the professional and nonprofessional subgroups, and (3) the multisample comparison option of LISREL (Jöreskog & Sörbom, 1985), we estimated three models. Two of these, models A and B, contained different assumptions about the equality of

causal parameters in the professional and nonprofessional subgroups. In model A, the causal parameters were not the same; in model B, these parameters were equal across the two subgroups. Model C restricted the causal paths (γ 's, β 's) to 0 and served as a baseline for calculating the normed fit index (Bentler & Bonett, 1980). As part of this overall process, we estimated the magnitude and direction of the specific causal paths in Organ and Greene's model in the two subgroups. Finally, we tested the compensatory process they proposed by decomposing the total effects of formalization on alienation among professionals and nonprofessionals. The Appendix describes these phases of the analysis in greater detail.

FIGURE 1
Latent-Variable Representation of Organ and Greene's (1981) Model^a



^a λ , δ , and ϵ_1 through ϵ_4 are fixed parameters.

RESULTS

Table 1 provides descriptive information for comparing the professionals and nonprofessionals in this study as well as the means, standard deviations, and reliabilities for the variables studied. As indicated in this table, although professionals and nonprofessionals were similar with respect to their age and tenure, professionals generally made more money and were more likely to be men than were nonprofessionals. In addition, professionals also expressed less organizational commitment, perceived less organizational formalization, and perceived greater role ambiguity and role conflict than nonprofessionals.

Table 2 reports the Pearson product moment correlations among the variables included in the structural equation analysis. Contrary to the findings of Organ and Greene (1981), the zero-order correlations reported in this table between formalization and role conflict were negative in both subgroups.

Model A ($\chi^2 = 8.44$, $df = 4$) was compared with model B ($\chi^2 = 16.29$, $df = 12$) to determine if the causal parameters ($\gamma_1 - \gamma_3$, $\beta_1 - \beta_5$) were equal in the professional and nonprofessional subgroups. The resulting difference in chi-squares (7.85) failed to exceed the critical value associated with eight degrees of freedom. Thus, we did not reject the hypothesis of equal causal effects among the professional and nonprofessional subgroups. Relationships between formalization, role conflict, role ambiguity, commitment, and alienation were similar for both. Next, we calculated the normed fit index for model B, applying the results for model C ($\chi^2 = 344.5$, $df = 20$). The resulting value equaled .95, an acceptable level. Lastly, we examined the estimates of each of the causal parameters in models A and B. Table 3 reports these estimates along with those of Organ and Greene. As noted in the Appendix, critical ratios greater than 1.96 generally indicate the important parameters of a model.

An examination of Table 3 provides some interesting, albeit, unexpected findings associated with model B. The results indicate that even though the paths from perceived formalization to role ambiguity, conflict, and organizational commitment (paths γ_1 , γ_2 , and γ_3) were significant, the direction of influence from formalization to role conflict was opposite the direction obtained by Organ and Greene (1981). More specifically, perceived formalization was found to decrease, rather than increase, role conflict in both subgroups. Moreover, contrary to Organ and Greene's findings, the parameter estimates associated with paths leading from role conflict to commitment and alienation (β_2 , β_4) were not significantly different from 0.

Table 4 presents the total effect of perceived formalization on alienation and the decomposition of this effect into its component parts, along with the findings reported by Organ and Greene. Consistent with these previous findings, results from this study indicate that, in general, organizational formalization reduces alienation through its effects on role ambiguity and organizational commitment [$(\gamma_1 \times \beta_3) + (\gamma_1 \times \beta_1 \times \beta_5) + (\gamma_3 \times \beta_5) = -.38$]. However, nothing indicated that formalization actually serves to increase alienation. Contrary to Organ and Greene's findings, formalization had no

TABLE 1
Comparison of Subpopulations^a

Variables	Professionals			Nonprofessionals			Tests of Differences ^b
	Means	s.d.	Cronbach α	Means	s.d.	Cronbach α	
Formalization	34.61	11.33	.86	40.52	9.81	.77	-4.16**
Role ambiguity	19.29	7.39	.84	13.09	5.90	.78	6.81**
Role conflict	19.64	7.84	.81	17.29	8.41	.82	2.24*
Organizational commitment	65.30	15.70	.87	69.45	16.71	.88	-1.97*
Alienation	13.34	7.62	.94	14.52	7.38	.88	-1.19
Age	37.12	9.04	—	36.40	13.30	—	0.51
Pay	\$1,850.00	\$618.00	—	\$1,336.00	\$510.00	—	6.70**
Tenure	4.90	4.60	—	4.90	4.80	—	0.00
Gender							
Men		70%			46%		
Women		30%			54%		3.81**

^a N = 86, professionals; N = 168, nonprofessionals.

^b These are values of t-tests except for the last, a Z-test of significance of the differences between two proportions.

* $p < .05$

** $p < .01$

TABLE 2
Pearson Product Moment Correlations Among Variables^a

Variables	x_1	y_1	y_2	y_3	y_4
x_1 . Formalization		-.68**	-.33**	.61**	-.46**
y_1 . Role ambiguity	-.43**		.41**	-.59**	.56**
y_2 . Role conflict	-.20**	.23**		-.28**	.18*
y_3 . Organizational commitment	.35**	-.41**	-.19**		-.55**
y_4 . Alienation	-.39**	.50**	.18*	-.59**	

^a Data for professionals ($N = 88$) are above the diagonal; data for nonprofessionals ($N = 168$) are below it.

* $p < .05$

** $p < .01$

positive effect on alienation through role conflict and organizational commitment [$(\gamma_2 \times \beta_4) + (\gamma_2 \times \beta_2 \times \beta_5) = .00$]. The path from formalization to conflict (γ_2) was negative, and the path from conflict to commitment (β_2) was nonsignificant.

DISCUSSION

The basic objectives of this study were to examine the generalizability of Organ and Greene's (1981) findings concerning the effects of formalization on alienation in both professional and nonprofessional populations. Consistent with our predecessors' findings, the overall effect of organizational formalization was to reduce alienation in both subgroups examined. As shown in Table 4, the magnitude of this effect ($-.38$ for model B) was even larger than that reported by Organ and Greene ($-.13$).

Contrary to Organ and Greene's reported results, however, the results from the present study provided only mixed support for their compensatory process explanation. Even though formalization decreased role ambiguity, it did not increase role conflict, as in their study. Moreover, the paths from role conflict to commitment and to alienation were not found to be significant for either professionals or nonprofessionals.

One possible reason for the negative relationship between organizational formalization and role conflict that we found is that organizational formalization may add clarity to jobs, which may subsequently reduce role conflict. This explanation is consistent with the positive relationship between role ambiguity and role conflict obtained in this study, as well as in most other studies that have examined these role stress variables (cf. Jackson & Schuler, 1985).

A second possible explanation is that the interests and expectations of the professionals we studied may not be consistent with those of the individuals used by Organ and Greene (1981), and these differences may have influenced the effects that formalization had on role conflict. They studied scientists whose professional interests perhaps focused more on exploratory research and development than on technical applications. The professionals

TABLE 3
Unstandardized Parameter Estimates^a

Parameters	Descriptions	Model A		Model B ^a	Organ and Greene
		Professionals	Nonprofessionals		
γ_1	Formalization to role ambiguity	-.53*	-.43*	-.43*	-.56*
γ_2	Formalization to role conflict	-.30*	-.24*	-.27*	.39*
γ_3	Formalization to organizational commitment	.60*	.36	.46*	.35*
β_1	Role ambiguity to organizational commitment	-.74*	-1.00*	-.89*	-.16*
β_2	Role conflict to organizational commitment	.01	-.15	-.09	-.31*
β_3	Role ambiguity to alienation	.45*	.46*	.42*	.22*
β_4	Role conflict to alienation	-.10	.01	-.02	.28*
β_5	Organizational commitment to alienation	-.16*	-.22*	-.21*	-.36*

^a Estimates for combined subgroups combined.

* Critical ratio > 2.0

TABLE 4
Decomposition of the Total Effect of Formalization on Alienation as Hypothesized by Organ and Greene

Paths	Model A		Model B ^a	Organ and Greene
	Professionals	Nonprofessionals		
Hypothesized to reduce alienation				
$\gamma_1 \times \beta_3$	-.24	-.16	-.18	-.12
$\gamma_1 \times \beta_1 \times \beta_5$	-.06	-.08	-.08	-.03
$\gamma_3 \times \beta_5$	-.10	-.08	-.10	-.13
Subtotal	-.40	-.32	-.38	-.28
Hypothesized to increase alienation				
$\gamma_2 \times \beta_4$.03	.00	.00	.11
$\gamma_2 \times \beta_2 \times \beta_5$.00	.01	.00	.04
Subtotal	.03	.01	.00	.15
Net effect of all paths on alienation				
	-.37	-.31	-.38	-.13

^a Results for both subgroups combined.

in the present study, primarily employees of medical or governmental organizations, may simply expect greater formalization than Organ and Greene's respondents, either because of the technical nature of their work or because many of them work in agencies in which formalized rules and regulations are the norm, or both. Given such expectations, formalization may tend to decrease, rather than increase, role conflict.

Yet another reason for differences in results may relate to differences in the informal relationships that exist among the professional groups studied. This explanation is consistent with the arguments of Nicholson and Goh (1983). These researchers hypothesized that in organizational subunits that are characterized by rapid developments and that are more relationship-than task-oriented—a description that may fit units in which professionals work—role conflict should be more strongly related to interpersonal variables, such as respect and liking for co-workers, than to structural variables like formalization. On the other hand, the opposite should be true for role ambiguity because “the uncertainty experienced results from a lack of information concerning an organizational role that can be defined only by the organization's structure (e.g., the nature of job rules and procedures, the degree of participation in decision making, and the span of the subordinates)” (Nicholson & Goh, 1983: 149). In support of their hypotheses, they found that although role ambiguity was related to structural variables both for production (nonprofessional) workers and research and development (professional) employees, role conflict was only related to interpersonal variables among the second group. Thus, it is possible that another reason for the differences between the results reported here and Organ and Greene's may be that differences existed in the interpersonal relationships in the populations examined.

Of course, given some of the inherent methodological differences in the two studies, some caution regarding these explanations of the differences in findings is necessary. For example, although the measures of role ambiguity, role conflict, and alienation used in the two studies were the same, the measures of formalization and organizational commitment were somewhat different. Thus, even though we intended to use scales that were conceptually the same as Organ and Greene's, it is possible that the slight differences in these measures produced the differences in the findings.

In addition, we used self-reports about formalization, and Organ and Greene averaged reports from three of each respondent's peers to measure this variable. Lincoln and Zeitz (1980) noted that differences may result from the use of individual versus aggregated data. Thus, it is possible that different levels of aggregation produced the differences in the results of the two studies. However, there are several points that make this explanation improbable.

First, if dramatic differences resulted from using individual rather than aggregated data, the patterns of zero-order correlations between formalization and the other variables in the two studies should reflect these differences. Such was not the case. More specifically, (1) with the exception of our negative correlation between formalization and role conflict, the correlations between formalization and the other variables showed a pattern consistent

with Organ and Greene's, and (2) with the exception of that negative relationship and the positive relationship between role ambiguity and role conflict for both of our subgroups, the direction of the correlations for all of the variables in this study are consistent with those reported by Organ and Greene. Moreover, with respect to the positive correlation between formalization and conflict Organ and Greene found, a recent meta-analysis of the literature on role conflict and ambiguity (Jackson & Schuler, 1985) indicated that, of the nine studies that have examined the relationship between formalization and role conflict, only Organ and Greene reported a significant positive relationship between these variables. Finally, we could find no evidence to suggest that Organ and Greene's theoretical orientation would require aggregated measures of formalization to test their model.

CONCLUSIONS

Contrary to popular opinion, but consistent with the findings reported by Organ and Greene (1981), the findings of the present study show that increased alienation is not an inevitable effect of increases in organizational formalization among professionals. Indeed, when taken together with their findings, our results suggest that managers and practitioners interested in decreasing alienation among professionals and nonprofessionals alike may judiciously consider the use of additional rules and procedures.

Unfortunately, the process by which formalization gets translated into decreased alienation still remains somewhat elusive. This is not to say that we know nothing about the processes that intervene between formalization and alienation. For example, it appears obvious that formalization tends to reduce alienation through its ability to decrease role ambiguity and increase organizational commitment. However, the effects of formalization on alienation through role conflict are substantially less clear. Given the findings of the present study, two particular themes may contribute to further exploration of this domain. First, the potential effects that characteristics of professionals' specific occupations, the tasks they perform, and the organizations that employ them have on their expectations require additional attention. Second, the potential interactive effects of informal relationships and organizational formalization processes should also receive further study.

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APPENDIX

Measurement model. The distinction between theoretical constructs and their indicators acknowledges a difference between the theoretical or conceptual definition of a variable and its operational definition (Bagozzi & Phillips, 1982; Hughes, Price, & Marrs, 1986). This distinction also provides a basis for accounting for measurement error, the effects of which should not be ignored (Bagozzi, 1980; Bagozzi & Phillips, 1982; Billings & Wroten, 1978; James, Mulaik, &

Brett, 1982; Kenny, 1979). In Figure 1, each indicator or scale score is shown as being influenced by the construct it is presumed to measure, as well as by random error; λ , δ , and $\epsilon_1 - \epsilon_4$ represent these causal influences. When only one indicator for each construct is available, identification problems make assumptions about the values of these parameters necessary. The square root of the reliability coefficient represented the causal influence of the construct on the indicator, and the quantity 1 minus the reliability multiplied by the variance of the measure indicated the effects of random error (Williams & Hazer, 1986).

General evaluation of model. LISREL VI (Jöreskog & Sörbom, 1985) was used to evaluate Organ and Greene's model and to estimate the causal parameters. We evaluated and compared three models using this program's multisample capability. Models A and B contained the causal parameters shown in Figure 1. In model A, the causal parameters ($\gamma_1 - \gamma_3$, $\beta_1 - \beta_5$) were not equal in the professional and nonprofessional subgroups; in model B, they were equal. In model C, the causal paths (γ 's, β 's) were restricted to 0; this model served as a baseline for calculating the normed fit index (Bentler & Bonett, 1980). For each model, we obtained a chi-square value that summarized its adequacy. As Jöreskog and Sörbom noted, this value is best regarded as a general goodness-of-fit measure rather than a valid test statistic.

The comparison of models A and B was based on the difference in values for chi-square between the two. This difference was not significant ($16.29 - 8.44 = 7.85$, $df = 8$), and model B, containing the equality restrictions, was tentatively accepted. Next, we used the chi-square value for model B to calculate the normed fit index (NFI): $(\chi^2_{\text{model C}} - \chi^2_{\text{model B}}) / \chi^2_{\text{model C}} = \text{NFI}$. The resulting value was .95, an acceptable level. Next, we determined the importance of each parameter in model B by examining the magnitude of the critical ratios associated with each of the parameter estimates. This ratio, defined as the parameter estimate divided by its standard error, has an approximate z-distribution (Bentler, 1980); thus, critical ratios less than 1.96 suggest that the parameter is probably not necessary to the model, and critical ratios exceeding this value indicate essential parameters. These parameters are identified with asterisks in Table 3.

Decomposition of effects of organizational formalization. As a final stage in the evaluation of Organ and Greene's model, we decomposed the total effect of organizational formalization on alienation in both subgroups into its indirect effects. This decomposition, which was necessary to test for the compensatory processes Organ and Greene proposed, used the same procedures they employed. First, we analyzed the paths from formalization that they found reduced alienation. These included the paths from formalization through role ambiguity to alienation ($\gamma_1 \times \beta_3$), from formalization through role ambiguity to organizational commitment and alienation ($\gamma_1 \times \beta_1 \times \beta_5$), and from formalization through organizational commitment to alienation ($\gamma_3 \times \beta_5$). Next, we analyzed the paths from organizational formalization that Organ and Greene found increased alienation, including one path from formalization through role conflict to alienation ($\gamma_2 \times \beta_4$), and another through role conflict to organizational commitment and alienation ($\gamma_2 \times \beta_2 \times \beta_5$). By combining the effects of those paths hypothesized to increase alienation and those hypothesized to decrease alienation, and then comparing these values, we totaled the compensatory process.

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PERCEIVED JOB AUTONOMY IN THE MANUFACTURING SECTOR: EFFECTS OF UNIONS, GENDER, AND SUBSTANTIVE COMPLEXITY

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This study examined the relationship of unionization to employees' perceptions of the amount of freedom they have in deciding what to do on their jobs and how to do it. There are several reasons for believing that job autonomy, both perceived and actual discretion in making decisions, is lower for employees who work under union contracts than for those who do not. Both management practices and union priorities may be accountable. We did not assume—as has much previous research and theory—that the influence of unions is uniform for all employees. In particular, we hypothesized that the relationship between unionization and perceived job autonomy is stronger for men than for women.

Managerial policies and practices may diminish the perceived job autonomy of employees in unions, because management may resort to formalization of policies and practices (Kochan, 1980) to ensure uniform treatment of rank-and-file employees across jobs, often a key issue in collective bargaining. This results in narrower and more uniformly applied job descriptions (Slichter, Healy, & Livernash, 1960) and centrally coordinated work rules and disciplinary regulations (Dimick, 1978). Additionally, as Verma and Kochan (1985) noted, since the 1970s, some nonunion plants have adopted sophisticated strategies for human resource management that emphasize employees' involvement in decision making and broad-banded job classification as a means of avoiding unionization. Thus, we expect employees to experience lower job autonomy in unionized firms than in nonunionized firms either as a direct result of management decisions in the first, or as an indirect result of such decisions in the second.

Another reason to expect lower actual and perceived job autonomy among unionized employees is that union officials have traditionally emphasized bread-and-butter issues like wages, benefits, and employment security, and have regarded issues having to do with job enrichment, such as increases in discretion, task variety, feedback, as ranking at the bottom of their priorities (Holley, Field, & Crowley, 1981). Thus, union officials may not be predis-

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posed to resist managerial adjustments that constrain employees' job autonomy.

With regard to gender differences, previous research suggests several ways in which women may benefit less from union membership than do men: (1) the wage premium paid for union labor is substantially less for women than men, even when occupations, industries, and personal qualifications are comparable (Antos, Chandler, & Mellow, 1980);¹ (2) unions have been slow to address issues that particularly affect women, such as equal pay and the need for childcare (Dewey, 1971; Sutton, 1980); and (3) women have failed to achieve leadership positions in unions in proportion to their numbers (Dewey; Sutton). Further, women continue to be overrepresented at the low end of the job spectrum in positions having little decision making power or autonomy (Brown, 1975; Heilman, 1983). For women, unionization may therefore reduce job discretion in positions that involve very little discretion to begin with. Thus, we expected men to have greater perceived job autonomy than women even under union contracts and we expected that the difference in perceived autonomy that union status would account for to be smaller for women than men. In these ways we expected gender and union status to interact in determining perceived job autonomy.

For both women and men, unionization is only one of many factors related to job autonomy, which should in general be closely tied to the objective structure of employees' jobs. One facet of structure that has been shown to influence job autonomy is substantive complexity (Rousseau, 1982), or the degree to which "the work, in its very substance, requires initiative, thought, and independent judgment" (Kohn & Schooler, 1983: 22). Since union jobs may differ systematically from nonunion jobs in complexity, we controlled for substantive complexity before examining effects of unionization. Following the above rationale, we hypothesized that at any given level of substantive complexity, employees in union jobs have less perceived autonomy than their nonunion counterparts.

The present investigation differed from previous studies of unions' effects on job content in several important ways. We focused exclusively on job autonomy, rather than relying on a composite measure of job scope that combines a variety of dimensions along which jobs can vary (cf. Berger, Olson, & Boudreau 1983; Kochan & Helfman, 1981). Job autonomy is of particular interest because of its effects on employees' mental health. For instance, Karasek (1979) found that freedom in making decisions on the job was associated with relatively fewer symptoms of exhaustion, anxiety, and depression, even when job demands were heavy. In addition, we analyzed data collected for a homogeneous sample of employees in manufacturing industries, thereby eliminating variability in levels of union representation and bargaining strength due to differences in economic sectors.

¹ It is important to note, however, that the union wage premium paid to women is substantial, even though it does not equal that paid to men. Moreover, the recent national attention that the issue of pay equity has received is largely due to the efforts of unions, especially the American Federation of State, County, and Municipal Employees.

METHODS

Sample

Drawing from the 1977 Quality of Employment Survey (Quinn & Staines, 1979), a national, cross-sectional probability sample of 1,515 adults working 20 hours or more per week that represents all employed adults, occupations, and industries, we selected 290 employees. We restricted our selection to nonsupervisory personnel who worked 30 to 70 hours per week in manufacturing. The employing industries produced a broad range of durable and nondurable goods; the largest proportions were producers of transportation equipment, machinery, metals, and apparel. We restricted the sample thus because supervisors lay outside of the potential domain of collective bargaining, and their jobs may differ systematically from nonsupervisory positions in autonomy and substantive complexity. Using only data from employees in manufacturing reduced heterogeneity and assured adequate numbers of union members. The proportion of union membership in the manufacturing sector is large relative to the total labor force; it was 37 percent in 1978 (U. S. Department of Labor, 1980). Slightly less than one-half of the employees in our sample ($n = 140$) held jobs covered by collective bargaining agreements and were thus considered to be unionized.

Measures

Indices, constructed from items from existing surveys (Quinn & Staines, 1979), measured job autonomy as well as several control variables. Control variables included factors known to precede unionization (Block & Premack, 1983; Fiorito & Greer, 1982), including employees' levels of educational attainment, sizes of firms, and such direct outcomes of collective bargaining as wages.

Demographic information was available on gender, race, age, marital status, years of school completed, geographic location of residence, and size of city of residence for all employees. Information on conditions of employment included firms' sizes and employees' organizational tenure. The measure of actual income was derived from employees' reports of their hourly wages or salaries. The distribution of hourly wages deviated substantially from normality, and so we used a logarithmic transformation to reduce distributional skewness and kurtosis.

Employees' occupational titles taken from the *Dictionary of Occupational Titles* (DOT) (U.S. Employment Service, 1977) were used to derive scores for substantive job complexity. For each title,² the score was the sum of three 3-digit codes for complexity of work with people (clients or co-

² The 1977 Quality of Employment Survey used a shorter list of job titles than did the DOT; for example, the DOT differentiated four kinds of tailors, whereas the Quality of Employment Survey grouped all tailors into a single category. For manufacturing jobs, the error introduced by the use of broader job categories appears to have been small, since the 3-digit complexity codes assigned to titles within the broader job categories were usually identical.

workers), data (information or ideas), and things (equipment). The scale of complexity of dealing with things, for example, rose from handling equipment, through driving or operating equipment, to precision work or setting up equipment. We assigned scores for substantive complexity independently of employees' responses on the survey and based them solely on job title. Fine (1968) developed this scheme for scoring occupational complexity, which has been used extensively for occupational description and classification (Miller, Treiman, Cain, & Roos, 1980). Kohn and Schooler (1983) provided evidence of convergent validity; they found that the DOT appraisals for occupations as a whole were highly correlated (multiple $R = .78$) with ratings of the complexity of work with people, data, and things based on interviews with individual employees.

The scale that measured perceived job autonomy, taken from Quinn and Staines (1979), used a 4-point format with 1 for strongly disagree and 4 for strongly agree. It asked respondents to indicate the extent to which they agreed that as employees, they (1) had freedom to decide what to do, and (2) how to do their own work, (3) had responsibility for deciding how the job got done, (4) had a lot to say about what happened on the job, and (5) had latitude to decide when to take breaks, (6) with whom they worked, and (7) the speed at which they worked. Scores were based on the average of all items in the scale. The average interitem correlation was .37 ($\alpha = .80$).

RESULTS

Consistent with previous research (Block & Premack, 1983; Fiorito & Greer, 1982), employees who worked under union contract differed significantly ($p < .05$) from those who did not, both in their personal backgrounds and employment characteristics. Unionized employees were more likely to be male, nonwhite, and employed in large industrial firms outside of the South. They had less education, had been with their present employers longer, and received higher wages than their nonunion counterparts. Union and nonunion employees did not differ in age or marital status, nor did their cities of residence differ as to size of population.

Given the many significant differences between union and nonunion employees, we sought to determine which of them overlapped and which were most strongly related to union status. For this purpose, we used discriminant function analysis, identifying five variables—race, education, geographic region, firm's size, and wages—that contributed significantly to the optimal discrimination of union and nonunion employees (Wilks' $\lambda = .77$, $\chi^2_5 = 73.2$, $p < .001$). In subsequent regression analyses, these five variables served as controls.

To examine the contributions to perceived job autonomy of unionization and substantive complexity, we used hierarchical regression analysis, with control variables entered first. Next, we entered employee's gender, then substantive complexity, and lastly, union status. The regression equation accounted for 21 percent of the variance in perceived job autonomy ($F_{9, 269} =$

9.06, $p < .0001$). In the final equation with all variables entered, gender added 6 percent to the variance in perceived autonomy accounted for by the control variables ($\beta = .28$, $t_{278} = 4.78$, $p < .0001$); substantive complexity contributed an additional 3 percent ($\beta = .16$, $t_{278} = 2.65$, $p < .01$), and union status added 5 percent ($\beta = -.26$, $t_{278} = -4.09$, $p < .0001$). Employees highest in perceived autonomy were men who held positions involving complex dealings with people, data, and things, and whose workplaces were not unionized. Conversely, those lowest in perceived autonomy were women whose work did not involve complex dealings with people, data, and things, and whose jobs were unionized.

However, gender qualified the contributions of substantive complexity and unionization. Table 1 presents the results of a split group analysis (Arnold, 1982, 1984) used to compare regression weights estimated separately for men and women. The significance of the difference of the two regression weights was tested with the t formula provided by Arnold (1982).

For women, the substantive complexity of their jobs significantly predicted perceived autonomy but union status did not. In both unionized and nonunionized firms, women with relatively high autonomy held positions that were more substantively complex. Although union status had no direct relationship to women's perceived autonomy, it appeared to be indirectly related to autonomy through its association with substantive complexity. On the average, women who worked under union contracts held jobs that were less substantively complex than those of their nonunionized counterparts ($t_{83} = 3.28$, $p < .002$). Within the union sector, women held less complex jobs than did men ($t_{138} = -3.01$, $p < .003$), despite comparable organizational tenure (for men, $\bar{x} = 5.6$ years; for women, $\bar{x} = 5.9$ years).

For men, the reverse pattern held: substantive complexity did not predict their perceptions of job autonomy, but unionization did. Regardless of the actual complexity of their dealings with people, data, and things, men

TABLE 1
Results of Regression Equations of Perceived Job Autonomy
on Substantive Complexity and Union Status

Independent Variables	Women ^b			Men ^b		
	sr^2	Betas	t	sr^2	Betas	t
Control variables ^a	.04		.82	.03		1.06
Substantive complexity	.11	.37	2.97*	.02	.11	1.52
Union status	.00	-.03	-.21	.10	-.36	-4.64**
R^2	.15			.15		
F	1.92			4.70**		
df	(7, 74)			(7, 190)		

^a Control variables were race, education, geographic region, firm's size, and hourly wages.

^b The squared semipartial coefficient (sr^2) at each step is the increase in R^2 associated with the predictor variable entered when all previously entered variables have been partialled.

* $p > .01$.

** $p > .001$.

who saw their jobs as providing more freedom in deciding how to do their work were more likely to hold positions in nonunion firms. No difference was found in the substantive complexity of jobs held by men who worked under union contract and the jobs of those who did not.

Union status added nothing to the variance explained by other variables in women's perceived job autonomy, but it explained 10 percent of the variance for men (see Table 1). A significant difference between men and women was found in the standardized regression coefficients for union status ($t_{275} = 2.38, p < .02$), indicating that for women, union status made a smaller difference in scores for job autonomy than it did for men.

We also found that an employee's gender moderated the relationship between substantive complexity and perceived autonomy; however, the evidence was less conclusive. Substantive complexity added 11 percent to the variance in women's job autonomy explained by other variables, compared to 2 percent for men. A marginally significant difference was found between men and women in the standardized regression coefficients for substantive complexity ($t_{275} = 1.94, p < .06$).

Thus, for perceived job autonomy, the relative importance of union status and substantive complexity differed for men and women. It should be noted, however, that the overall regression equation was significant only for men (see Table 1), suggesting that the present model is less predictive of women's perceptions of job autonomy than men's. The evidence is not conclusive, since the lack of significance could also be due to the small number of women in the sample.

DISCUSSION

The purpose of our investigation was to examine the relationship of unionization and employees' freedom in deciding how to do their work. We found that employees who held union jobs in manufacturing perceived themselves to be less autonomous than their nonunion counterparts, a result consistent with previous research (Berger et al., 1983; Kochan & Helfman, 1981). Our findings, coupled with those of Berger and his colleagues and with Kochan and Helfman's, suggest that the negative effect of unions on job content persisted through 1977, despite a growing interest in union-management programs on work redesign and employee participation. Nonetheless, our findings must be evaluated with caution, since any negative effects that unions have on job autonomy may be more characteristic of older plants unionized between 1940 and the 1960s, than of newer, more recently unionized plants (Verma & Kochan, 1985).

The findings reported here expand on previous research by demonstrating that unions and substantive complexity do not have uniform relationships to perceived autonomy across employees; rather, gender qualifies these relationships. Gender differences in values and preferences concerning work are unlikely to account for these differential relationships. In recent analyses of national survey data, researchers have found few differences between

women and men in work values (Lacy, Bokemeier, & Shepard, 1983; Walker, Tausky, & Oliver, 1982). Rather, the lower complexity of women's jobs in union firms, and the stronger relationship of complexity to perceived job autonomy for women than for men may be due to typing of jobs by gender. According to Heilman's (1983) fit model of occupational gender bias, women are expected by both others and themselves to be less active, competent, and independent than men. In keeping with these expectations, women are typically assigned, or choose, jobs demanding relatively less effort, skill, and judgment. Thus, women in manufacturing who held more substantively complex jobs were the exception rather than the rule; for them, complexity should have a pronounced effect on their evaluations of job autonomy.

Gender-typing is also one possible explanation of the finding that union status was a more important predictor of perceived autonomy for men than women. Following Kochan (1980), we conceptualized the effect of unionization on job autonomy as mediated primarily by managerial policies and practices. Managerial adjustments that reduce freedom in decision making in union firms, or increase discretion in nonunion firms, may result in greater absolute changes in men's job autonomy than in women's, because gender-typing may restrict women's access to jobs with discretion (Brown, 1975).

A second possible explanation is that unions raise members' expectations on quality-of-work-life issues or their willingness to voice existing dissatisfactions (cf. Kochan & Helfman, 1981). However, a union's influence on employees' expectations and behavior may often be greater for men than women. On the basis of investigations of group dynamics and attitude changes (e.g. Cartwright & Zander, 1968), we suggest that employees are more likely to identify with and be influenced by unions when they see them as instrumental to personal goals. Compared to men, women may perceive unions as having lower instrumental value, since the wage premium paid for union labor is less for women than for men, and unions have often failed to address the issues of equal pay and childcare (Antos et al., 1980; Dewey, 1971; Sutton, 1980). Empirical evidence consistent with the possibility that gender mediates union identification has been reported (Gordon, Philpot, Burt, Thompson, & Spiller, 1980); that study found important differences between men and women in union loyalty and willingness to act to protect the interests of the union.

Since our data are cross-sectional and do not include independent measures of actual administrative policies and procedures, we cannot choose between these alternative explanations. Moreover, given the small size of our sample, the generalizability of our findings must be evaluated cautiously. Thus, further research is required to address the issue of generality and provide a precise explanation of how unions affect job autonomy.

In addition, more research is needed on the implications for employees' well-being of managerial policies that reduce the substantive complexity of work, or lower autonomy. In a longitudinal analysis, Kohn and Schooler (1983) demonstrated that work's substantive complexity actually changes employees' intellectual flexibility. Thus, managerial policies and practices

that reduce substantive complexity or constrain autonomy may have unanticipated, long-term consequences for employees' intellectual functioning and psychological well-being.

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EFFECTS OF FEEDBACK ON THE SELF-CONFIDENCE OF MEN AND WOMEN

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Although legal and social support for women's careers have increased in the last decade, compared to men, women remain concentrated in lower paying, lower prestige jobs (Stephens & Denisi, 1980; Taylor & Ilgen, 1981). The present study was an attempt to understand more fully why women do not excel to the same extent as men in organizational settings. A contingency approach was taken, and the interaction between a personal characteristic of women, low self-confidence, and an aspect of job environments in which women may work, the presence or absence of feedback, was examined.

It is a well-established research finding that women are more likely than men to express low self-confidence in achievement situations (Maccoby & Jacklin, 1974: 150–163). As used here, self-confidence connotes how individuals perceive their ability to succeed at a particular endeavor, or judge their effectiveness once a task is finished. It is a subjective estimate and need not be congruent with true probabilities.

A review of the literature on self-confidence indicates that at least one situational variable—feedback—seems to moderate women's tendency to denigrate their chances for success (Lenny, 1977). Women's levels of confidence have been found to be significantly lower than those of men in the absence of feedback, but they can be equal to those of men in the presence of externally mediated feedback. Gender differences in self-confidence appear to have been eliminated or even reversed in experiments in which a task itself supplies immediate feedback to a performer,¹ or in which assessment of performance comes from someone who has observed or recorded a subject's behavior and can evaluate it (Feather & Simon, 1971; McMahan, 1973; Montanelli & Hill, 1969; Rychlak & Eacker, 1962).

Although promising, these conclusions about the effects of feedback on self-confidence are methodologically suspect, because they come from studies in which feedback and self-confidence were not jointly the main focuses of investigation; rather, these variables happened to be incorporated in the same experiments, making post hoc examinations of their relationship possible. These post hoc findings have then been compared to results from other studies on self-confidence in which feedback was absent. Before researchers can endorse the use of feedback as a remedy for the low self-confidence of women, these findings must be empirically verified. Towards this end, the present study investigated the self-confidence of men and women performing a series of tasks on which control groups received no feedback, and experimental groups received either positive or negative feedback.

On the basis of data from previous research, the following hypotheses were framed:

Hypothesis 1: Before beginning unfamiliar tasks, women will have lower self-confidence than men.

Hypothesis 2: Across tasks in which no external performance cues are supplied, women will report lower self-confidence than men.

Hypothesis 3: (a) In the presence of positive external feedback, men and women will not differ significantly in their ratings on self-confidence. (b) In the presence of negative external feedback, men and women will not differ significantly in their self-confidence ratings.

¹ Solving anagrams is an example of such a task.

METHODS

Experimental Design

The experiment used a mixed design with repeated measures, which included two between-subjects and one within-subjects variables (Myers, 1972). There were two gender levels, men and women; three levels of feedback, positive, negative, and none; and three measures of self-confidence for each subject, taken at three separate times.

The major consideration in selecting a task was that it be sufficiently novel and ambiguous to create questions in subjects' minds about how well they were performing. External reports from an informed source, which subjects would then need to assess their success or failure adequately, would allow the experimenter to manipulate feedback. Guilford (1959) developed a task that is adaptable to this criterion. Used frequently as a measure of creativity, it requires subjects to consider unique uses for ordinary objects. Subjects in all conditions worked on the same three objects—a pencil, a wire hanger, and a cardboard box—which were presented in random order.

Subjects and Procedures

As part of their course requirements, 114 men and 62 women, undergraduate students in a college of business, participated in the study. Randomly assigned subjects reported to an experimental room in mixed-gender groups of six. The same experimenters, one woman and one man, were present for all sessions, but did not talk to the subjects, except during debriefing. A prerecorded set of instructions informed the students that they were participants in a creativity project that was a joint endeavor of several prestigious academic institutions in the local area. This information made it possible to add that a computer facility designed solely to process and tabulate data on creativity was currently operating in the same building.

Subjects were told that they would have five minutes to work on each of three tasks in which they would develop unusual uses for some common objects. The recording further instructed them that their answers would be compared to those of "hundreds of other students who have already participated in the study" and evaluated for both quantity and quality of ideas, although quality would have greater weight in determining overall scores. These instructions were intended to reduce suspicion that might arise when subjects produced lists that did not visually match the feedback they received. For example, if a subject randomly designated to receive positive feedback produced an exceptionally short list of uses for a given object, a high score could be justified if the individual could assume the ideas were more creative than those generated by others and thus received high quality points. Similarly, a subject who wrote a long list of uses could conceivably do poorly if the responses were commonly elicited ones scored low on quality. In the no-feedback condition, subjects were told that their performance results would not be available until the following day. In the feedback conditions, subjects anticipated receiving coded results at the end of each work period.

Students then proceeded to work through their test booklets, completing three tasks and three statements about their confidence in accordance with the directions outlined on the tape.

After each task, subjects were required to remove their answer sheets from their test booklets and give them to an assistant, who ostensibly took them down to the computer facility for analysis. When the assistant returned, he gave each subject a coded computer card that had been prepunched with a variety of information, including randomly distributed performance feedback in the form of a percentile score. Since College Board Exams and other scholastic tests often use percentile scoring systems, it was assumed that students would have little difficulty understanding the results. However, the instructions clearly emphasized that the higher the percentile, the better the performance. To ensure that there were no errors in reading the cards, students were asked to write out their results on separate pieces of paper, which the assistant verified for accuracy. At no time were students allowed to talk with each other about the experiment or their results.

Each card also held a four-digit identification number, selected by each student at the beginning of the experiment and coded onto the card by the assistant during his absence. Postexperimental reactions indicated that this manipulation was highly effective in making the results credible.

Criterion Measure and Analysis

Self-confidence was measured by responses to two questions: "How confident are you that you can perform as well as other students on the following task(s)?" asked at times 1 and 2, and "If you were to perform this same task in the future, how confident are you that you could perform as well as other students?" asked at the conclusion of the experiment. The accompanying scale on which students marked their confidence ranged from 0 to 100.

A $2 \times 3 \times 3$ analysis of variance for unequal cell sizes (Winer, 1971) was performed as an overall test for the hypotheses concerning effects of gender and feedback. The dependent variable in the ANOVA was self-confidence on the task measured at three separate times. Planned comparison procedures were used to determine results concerning specific hypotheses.

RESULTS

The initial analysis of variance tested for differences in the response patterns of men and women within the various feedback conditions. The portion of the analysis relevant to this issue was the interaction of feedback and gender, which was not significant ($F = 1.78$). Thus, feedback had a similar effect on both genders.

A *t*-test performed on the confidence scores of men and women at time 1 was significant ($p < .000$), confirming Hypothesis 1. Before beginning an unfamiliar task, men have higher confidence than women about their potential to perform well.

To determine whether gender differences in self-confidence persist across time in the absence of feedback, *t*-tests were performed on all three confidence scores of men and women in the no-feedback condition. Table 1 presents the results of these analyses. The tests for differences were all significant, supporting Hypothesis 2: across a situation in which subjects receive no feedback on performance, women give dramatically lower estimations than men of their potential to excel on the task at hand ($p < .002$). This *a priori* finding can now be added to an extensive list of post hoc research results supporting the conclusion that, in the absence of feedback, women are more likely than men to underestimate their potential to excel at a given task and also to give lower self-evaluations of their completed performance (Lenney, 1977). Of further interest was a finding that the self-confidence of both men and women in the no-feedback condition decreased over time ($p < .04$), suggesting that lack of reaction actively depressed expectations of success.

Additional *t*-tests were performed on the time 2 and time 3 responses of subjects in both the positive and negative feedback conditions. Table 2 displays the results of these analyses. The data support neither Hypothesis 3a nor 3b, since they reveal that in the presence of both positive and negative feedback, men give significantly higher estimates of confidence than women ($p < .03$). This unexpected finding is inconsistent with Lenny's conclusion that men and women subjects who are provided with clear information on their task-specific abilities will report equal levels of self-confidence (1977: 6).

DISCUSSION

The most significant finding of this study was that women's levels of self-confidence were never equal to those of men. Women seemed to approach this achievement situation with significantly less confidence than peers who were men; more unexpectedly, this confidence gap did not disappear when

TABLE 1
Results of *t*-Tests for Differences in Self-Confidence
for Men and Women in the No-Feedback Condition^a

Subjects	Time 1	Time 2	Time 3
Men			
Means	77.35	73.09	71.32
Standard deviations	18.32	22.47	20.09
Women			
Means	58.25	54.50	55.50
Standard deviations	12.70	13.27	10.79
	$t = 4.51$	$t = 3.36$	$t = 3.25$
	$p < .000$	$p < .001$	$p < .002$

^a $df = 52$ for each *t*-test.

TABLE 2
Results of *t*-Tests for Differences in Self-Confidence
for Men and Women in the Positive and Negative Feedback Conditions^a

Subjects	Positive Feedback		Negative Feedback	
	Time 2	Time 3	Time 2	Time 3
Men				
Means	85.00	86.20	50.57	44.86
Standard deviations	10.55	5.76	16.97	13.85
Women				
Means	75.71	80.00	31.43	37.14
Standard deviations	15.60	10.49	12.86	9.69
	$t = 2.84$	$t = 3.11$	$t = 4.45$	$t = 2.24$
	$p < .006$	$p < .003$	$p < .000$	$p < .03$

^a $df = 64$ for positive feedback; $df = 54$ for negative feedback.

men and women received identical cues about their performance. Given that an individual's self-perception of competence can affect motivation (Battle, 1965, 1966; Feather, 1963; Feather & Simon, 1973), women's ability to advance in the working world may be restricted.

These results also established feedback's role in influencing an individual's confidence about future performance. All experimental conditions conveyed similar information to the subjects about their task potential. Both men and women responded to positive feedback by increasing their performance expectancies, and they responded to negative and no feedback by lowering their performance expectancies. These findings have important implications for applied settings.

Theorists have argued for many years that the presence of positive reinforcement is all that is needed to motivate workers (Skinner, 1953; Wiard, 1972). Thus, the effectiveness of positive feedback in raising confidence levels in the present study was not a surprising discovery. However, that lack of feedback could take on active and undesirable properties was an unexpected finding. When organizations deprive their employees of specific, job-related information, they may unknowingly inhibit their performance. In this investigation, both men and women responded to lack of feedback by lowering their estimations of how well they anticipated performing.

Finally, data from the negative feedback condition clearly demonstrate that unfavorable results depress the self-confidence scores of both men and women. This is an important finding in light of the near omnipresence of punishment in organizational settings (Luthans & Kreitner, 1975).

In summary, if it is true that the evaluation of behavior and performance is a critical ingredient in any employee's development (Terborg, Peters, Ilgen, & Simon, 1977), the data obtained in this experiment imply that such an evaluation is more essential for women than it is for men. Compared to the women, the men exhibited a continued sense of potency about their pros-

pects of succeeding. Their optimism was especially dramatic in the absence of feedback on performance. Men who received no feedback at all during the experiment had confidence levels as high as those of women who had received strong positive signals that they were doing well. If managers have limited time and energy to devote to providing feedback, they should give priority to directing pertinent job information to women employees, who need to be provided with opportunities to foster the same kind of confidence that men display.

Finally, since this study used university students in a laboratory environment, generalizing the findings to less educated or more mature individuals in actual work settings should be done with caution. However, the men and women in this investigation deviated in two significant ways from the commonly used "college sophomore" subject. First, they were somewhat older, with an average age for all participants of 21.3 years. Second, these students had held industrial jobs related to their business major for two separate six-month periods. This work exposure could possibly have given them a stronger orientation to the working world than might be found in other groups of student subjects. Of course, if these findings are to be considered transferable across populations, this study should be replicated with other types of people in other settings.

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ON THE CAUSAL ORDERING OF JOB SATISFACTION AND ORGANIZATIONAL COMMITMENT

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Organizational commitment is usually defined as the extent to which an employee identifies with and is involved in an organization. Porter, Steers, Mowday, and Boulian (1974) identified three components of commitment: (1) a strong belief in an organization's values and goals, (2) a willingness to expend considerable effort for it, and (3) a strong intent or desire to remain employed by the organization. In contrast, other scholars have defined job satisfaction as the extent to which an employee expresses a positive affective

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orientation toward a job (Smith, Kendall, & Hulin, 1969). In addition, job satisfaction has been treated as both a global concept referring to overall satisfaction and as a facet-specific concept referring to various aspects of work, such as pay, supervision, or workload (Cook, Hepworth, Wall, & Warr, 1981). Although many have assumed that satisfaction is a determinant of commitment (Angle & Perry, 1978; Buchanan, 1974; Hrebiniak & Alutto, 1973; Koch & Steers, 1978; Reichers, 1985; Steers, 1977; Wakefield, 1982), Bateman and Strasser (1984) suggested that the reverse causal ordering may be true.

Knowledge of the correct causal ordering of these variables has both theoretical and practical implications. We identified two theoretical implications. First, both variables have been widely investigated as dependent variables. If commitment is causally antecedent to satisfaction, as Bateman and Strasser suggested, then studies of satisfaction that omit this variable have employed misspecified models, which could have resulted in erroneous inferences concerning the importance of other variables linked to satisfaction. A similar line of reasoning can be applied to commitment.

Second, both satisfaction and commitment are important in models that attempt to describe the processes through which individuals' experience of work influences various outcomes, such as absenteeism and turnover. For instance, Steers and Rhodes (1978) viewed both satisfaction and commitment as determinants of motivation to attend, which, in turn, influences actual attendance. Price and Mueller (1986) proposed that commitment mediates the influence of satisfaction on turnover, which places satisfaction causally prior to commitment. Correct specification of the roles of satisfaction and commitment as intervening variables in such models requires knowledge of their correct causal ordering. In addition, if analysts simply treat the two variables as simultaneous determinants of an outcome, they may overlook total causal effects composed of both direct and indirect effects.

The ordering of satisfaction and commitment also has practical implications. In service organizations such as hospitals, effectiveness and efficiency require a high level of morale among employees, because the services rendered are personal and labor intensive. It is therefore important for managers to know how rewards and incentives are linked to outcomes like satisfaction and commitment. For example, if satisfaction is a determinant of commitment, it may be possible to indirectly influence commitment through a strategy that increases satisfaction. However, if the reverse causal ordering is true, and a manager is unaware of this, the same intervention strategy may not be effective.

Bateman and Strasser's (1984) finding that commitment is causally antecedent to satisfaction is troubling, because it contradicts a widely held assumption with empirical support. We identified three grounds on which to question their findings. First, they employed conventional least-squares regression, albeit within the context of a cross-lagged longitudinal model, and did not take measurement error into account. Correlated errors can be problematic in longitudinal models, and unreliability in measures can

differentially attenuate estimates of causal effects. This may account for their failure to find an effect of satisfaction on commitment. Second, they did not examine the possibility that temporal sources of error influenced their results. For example, method effects can produce underestimates of causal effects in longitudinal studies. Third, they did not employ the wide range of statistical controls that a high degree of confidence in the findings would mandate.

This study's objectives were to replicate and extend Bateman and Strasser's findings. Our model was similar to theirs and our respondents came from a comparable population, employees of hospital nursing departments. However, we employed an analytical strategy that controls for effects of measurement error and assesses other possible sources of error that may arise in longitudinal designs. In addition, our analysis included as statistical controls a number of independent variables representing many of the documented antecedents of satisfaction and commitment.

RESEARCH DESIGN

Population Studied

Respondents were employees in the nursing departments of five voluntary, short-term, general hospitals in a western state. This population, which was selected to replicate as closely as possible the population used by Bateman and Strasser, was part of a larger population consisting of all employees of the five hospitals, which was selected for a study of turnover and absenteeism among hospital employees (Price & Mueller, 1986).

Our subpopulation excluded men employees, because there were very few of them (19), as well as a small number of students and on-call employees who had no permanent attachment to the hospitals. The group of respondents used for the analyses reported here consisted of women working in nursing departments who returned questionnaires at two times ($N = 508$). Professional employees, primarily registered nurses, made up 67 percent; managers, all registered nurses, 10 percent; clerical workers, 9 percent; and service workers (nurses aides), 14 percent.

Data Collection

Data were collected for the larger study by means of a longitudinal design in which self-administered questionnaires were mailed to the homes of all hospital employees to maintain respondents' anonymity. The hospitals provided names and addresses. The first wave of data collection was completed in January 1981. Data taken from these questionnaires constitute the time 1 measurements. Data from a second wave of questionnaires, completed in August 1981, provide measures of satisfaction and commitment at time 2.

The response rate for the first wave was 63 percent of the total population; this yielded 2,192 useable questionnaires. The response rate for the second wave was 47 percent. Since information on response rates was not collected by departments, no response rate is available for the subpopulation used in

this study. However, the larger study's response rate for registered nurses, who make up 76 percent of our subpopulation, was 71 percent.

Measures

This study's primary focus is the interaction of satisfaction and commitment over time. We used a cross-lagged model similar to that employed by Bateman and Strasser (1984) to try to determine the causal ordering of these variables. The objective of the analysis was to ascertain the effects of satisfaction at time 1 on commitment at time 2, and the effects of commitment at time 1 on satisfaction at time 2. In addition, we included 15 variables as exogenous determinants of both satisfaction and commitment to serve as statistical controls. These include nine measures of employees' perceptions of organizational structure, four measures of employees' characteristics, and two measures of environmental characteristics. The Appendix presents descriptions of the variables and the questionnaire items.

Commitment was measured by the 9-item short version of the Organizational Commitment Questionnaire (Porter et al., 1974). Previous research has investigated the measurement properties of the 15-item version of this questionnaire (e.g., Mowday, Steers, & Porter, 1979). We measured satisfaction with six items selected from the index developed by Brayfield and Rothe (1951). Table 1 presents descriptive statistics and reliabilities for the

TABLE 1
Descriptive Statistics for Variables in the Analytical Models

Variables	Means	Standard Deviations	Reliabilities
Commitment, time 1	32.70	5.19	.874
Commitment, time 2	31.79	5.62	.898
Satisfaction, time 1	21.87	4.16	.868
Satisfaction, time 2	21.19	4.20	.863
Centralization	9.99	2.76	.804
Routinization	12.44	2.53	.689
Instrumental communication	31.13	4.99	.902
Promotional opportunity	13.64	4.16	.895
Organizational size	0.79	0.41	
Pay	13.53	5.07	.836 ^b
Distributive justice	12.50	3.28	.838
Integration	11.13	1.84	.560
Role overload	0.47	0.50	.489 ^b
Work involvement	16.17	2.18	.679
Length of service	6.05	5.11	.954 ^b
Education	14.99	1.33	.769 ^b
Turnover experience	1.83	1.13	.790 ^b
Employment opportunity	5.56	2.01	.792
Kinship responsibility	2.66	1.47	.944 ^b

^a The Appendix presents operational definitions of the variables.

^b The reliabilities for these variables are the test-retest correlations between time 1 and 2. All other reliabilities are measured with Cronbach's alpha. Organizational size is assumed to be measured without error.

satisfaction and commitment indexes at time 1 and time 2 and also for the exogenous variables used as statistical controls.

All of the multiple-item indexes are factor-based, which we derived from factor analyses using maximum likelihood extraction with varimax rotation. These analyses indicated that the items intended to measure a given variable loaded on a single factor, and the factor loadings were greater than 0.3 in magnitude. Of particular interest were the items measuring satisfaction and commitment. We factor-analyzed the items for these variables as a set to assess the validity of the distinction between the two concepts. With some minor exceptions, these data supported the notion that satisfaction and commitment are distinct concepts, and the results were similar for data from both time 1 and time 2. In short, we obtained support for the discriminant and convergent validity of these items.

Analytical Method

The data were analyzed with the LISREL statistical package (Jöreskog & Sörbom, 1981), a tool for estimating causal effects adjusted for measurement error, examining correlated residuals, and obtaining indicators of a model's fit to data. One of the advantages of using LISREL over more traditional methods like multiple regression is that it permits specification of latent and manifest variables, with explicit modeling of measurement errors. Latent variables often represent theoretical concepts, and manifest variables usually consist of multiple empirical measures for each concept. We did not use multiple indicators to specify our measurement model because the number of individual questionnaire items was large. Instead, we specified the factor-based indexes described in the previous subsection as single indicators of the concepts they are intended to reflect. We accounted for measurement error by setting the loadings of the indicators on the latent variables equal to the square root of the reliability coefficient. This is the appropriate strategy when a correlation matrix is analyzed with LISREL. Using this strategy provides an estimation of causal effects among the latent variables controlling for errors in measurement.

RESULTS

Table 2 presents the results of the LISREL analysis. The coefficients in this table may be interpreted as standardized partial-regression coefficients. These data show the cross-lagged effects of satisfaction and commitment, their stability coefficients—the effect of time 1 commitment on time 2 commitment, for example—and the effects of the control variables on satisfaction and commitment at time 1.

The cross-lagged effects of satisfaction at time 1 on commitment at time 2 ($-.002$) and of commitment at time 1 on satisfaction at time 2 ($.035$) are not statistically significant. Indeed, the magnitude of these coefficients is near 0. Thus, in contrast to the findings of Bateman and Strasser (1984), our results provide no basis for asserting that commitment has a causal effect on satisfaction. However, just as important, we found no support for the widely

TABLE 2
Standardized Coefficients for the Cross-Lagged Effects
of Satisfaction and Commitment and the Exogenous Variables^a

Independent Variables	Dependent Variables			
	Time 1		Time 2	
	Satisfaction	Commitment	Satisfaction	Commitment
Commitment, time 1			.035	.840*
Satisfaction, time 1			.809*	-.002
Centralization	-.122	-.035		
Routinization	-.460*	-.265*		
Instrumental communication	.063	.103*		
Promotional opportunity	.058	.144*		
Organizational size	-.055	.025		
Pay	-.166*	-.036		
Distributive justice	.195*	.272*		
Integration	.181*	.152*		
Role overload	.276*	.028		
Work involvement	.065	.165*		
Length of service	.099	.131*		
Education	-.152*	-.202*		
Turnover experience	.019	.092		
Employment opportunity	-.028	-.109*		
Kinship responsibility	.102*	.096*		
R ²	.584	.488	.688	.704

^a These LISREL coefficients may be interpreted as standardized partial regression coefficients. The maximum likelihood chi-square is 21.38, *df* = 30, *p* = .876.

* *p* < .05

held tenet that satisfaction influences commitment. There appeared to be no causal effects in either direction between satisfaction and commitment over time.

The model was modified to allow examination of the possibility that the error terms for the time 1 and time 2 measures of commitment and satisfaction are correlated. Correlated error terms can arise for various reasons, including method effects and the omission of variables that influence a dependent variable over time. For commitment, the longitudinal correlation between error terms is $-.137$; for satisfaction, it is $.076$. Neither correlation is statistically significant at the .05 level. In addition, allowing for these correlations did not significantly improve the overall fit of the model to the data. These results indicate that there are no sources of systematic variance biasing the estimates of the longitudinal effects of commitment and satisfaction.

The results also indicate that there was a high degree of stability (Heise, 1969) in commitment and satisfaction over the 7-month period between time 1 and time 2. The stability coefficient for commitment is .840; for satisfaction, it is .809. Although it is possible that levels of these variables fluctuated during the 7-month period, the similarity of these coefficients is interesting, because theorists have suggested that satisfaction should be less stable than commitment (Mowday, Porter, & Steers, 1982).

The concurrent correlations between satisfaction and commitment are also of interest.¹ At time 1, the zero-order correlation between satisfaction and commitment is .499. When the exogenous variables are held constant, the partial (maximum likelihood) correlation is .106, which is not statistically significant. For the time 2 measures, the zero-order correlation is .534, and the partial correlation is .190 (n.s.) when the time 1 measures are held constant. These results indicate that most of the covariation between concurrent measures of satisfaction and commitment is due to their common antecedents. For the time 1 measures, these antecedents were the variables we used for control purposes. For the time 2 measures, they were the measures of satisfaction and commitment at time 1.

Table 2 also shows the effects of the exogenous variables used as statistical controls. Routinization clearly has a strong influence on satisfaction measured at time 1, indicating that a high level of repetitive work depresses satisfaction. The second most important determinant of satisfaction is role overload; employees who felt that their workload was "about the right amount" were more satisfied than those who felt their workload was either too light or too heavy. Distributive justice and integration also have significant effects on satisfaction, with high levels of fairness of rewards and integration associated with high levels of satisfaction. Pay, education, and kinship responsibility also have statistically significant associations with satisfaction. With the exception of pay, the directions of these relationships are as expected. As a group, the exogenous variables explain almost 60 percent of the variance in satisfaction ($R^2 = .584$).

As for commitment, two indicators of organizational structure—routinization and distributive justice—have the strongest effects. High levels of repetitive work are associated with low commitment, and high levels of fairness of rewards are associated with high commitment. There is also an indication that individuals with relatively more education were less committed to the hospital. There are a number of variables with statistically significant effects of modest strength: instrumental communication, promotional opportunity, integration, work involvement, kinship responsibility, and opportunity. Taken as a group, the exogenous variables explain almost half of the variance in commitment at time 1 ($R^2 = .488$).

Possible effects of the exogenous variables on satisfaction and commitment at time 2 were also examined. We accomplished this by estimating effects for those variables that the LISREL modification indices indicated might have significant coefficients. However, including these variables did not significantly improve the fit of the model to the data, and the coefficients for individual variables were not statistically significant. In short, our analysis indicated that the exogenous variables had no effects on satisfaction and commitment at time 2 when the initial levels of these variables were held constant.

¹ Table 2 does not show these statistics.

DISCUSSION

The primary finding of this study is that there is no support for either of the hypothesized causal linkages between job satisfaction and organizational commitment. Our analysis did not indicate that satisfaction is a determinant of commitment, a commonly held position, or that commitment is a determinant of satisfaction. Thus, our results do not support Bateman and Strasser's (1984) finding that commitment is causally antecedent to satisfaction.

Although our population, measures, and analytical method were, in general, similar to those used by Bateman and Strasser, there are at least two potential explanations for the differences in our findings and theirs. First, although our respondents were similar, they were from a different geographical area. Although it seems unlikely this accounts for the discrepancy in findings, the possibility remains. Second, our measures of satisfaction and commitment differed somewhat from our predecessors', in that we used the short version of the Organizational Commitment Questionnaire and they used the long version. Similarly, they combined the subscales of the Job Descriptive Index to measure overall satisfaction, and we used a global measure. Thus, it is possible that different measurement strategies might account for the differences between the two studies.

Our examination of exogenous variables, such as routinization, distributive justice, and integration, indicates that employees' perceptions of organizational structure have relatively important effects on their satisfaction and commitment, in the expected directions, when the independent and dependent variables are measured concurrently. In addition, role overload has a strong association with satisfaction, but not with commitment. Other measures of organizational structure, employee characteristics, and environmental variables had statistically significant, but relatively modest, effects.

However, none of these relationships were apparent when we used the time-lagged measures of satisfaction and commitment as dependent variables while holding their initial levels constant. To a large extent, these results are similar to Bateman and Strasser's. Where they found a lack of causal effects over time for commitment, we found a lack of causal effects for both commitment and satisfaction. Taken together, the results of the two studies call into question previous theoretical assumptions about the antecedents of satisfaction and commitment.

Our analytical method permitted estimation of causal effects corrected for measurement error and assessment of temporal sources of error variance. Although we did not find any evidence that these methodological improvements account for the discrepancy between our results and Bateman and Strasser's, longitudinal analyses should address these issues.

Since both our respondents and Bateman and Strasser's were employees of nursing departments in hospitals, and both studies used similar time lags, future research should include samples from different populations and use different time lags. Future studies should also replicate this work for different measures of satisfaction and commitment. We used a global measure of

satisfaction; facet-specific measures might yield different results. For example, it might be argued that satisfaction with aspects of work that are clearly linked to organizational policies, such as degree of autonomy, may be more closely linked to commitment than are aspects like satisfaction with co-workers. Similarly, Reichers (1985) argued that commitment should be reconceptualized to address the possibility of multiple focuses.

In conclusion, we concur with Bateman and Strasser's recommendation that further research should employ dynamic designs to provide rigorous tests of causal models of satisfaction and commitment. The findings of our study, when coupled with theirs, suggest that the antecedents of both satisfaction and commitment require further theoretical specification and empirical evaluation.

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APPENDIX

Job satisfaction^a was measured by six items adapted from Brayfield and Rothe (1951): (1) I find real enjoyment in my job, (2) I like my job better than the average worker does, (3) I am seldom bored with my job, (4) I would not consider taking another job, (5) most days I am enthusiastic about my job, and (6) I feel fairly well satisfied with my job.

Organizational commitment^a was measured by the 9-item short version of the Organizational Commitment Questionnaire (Porter et al., 1974), with "hospital" substituted for "organization." Sample question: I would accept almost any type of job assignment in order to keep working for this hospital.

Centralization—the degree to which power is concentrated in an organization—was measured by four reverse-coded items: (1) how much freedom do you have as to how you do your job? with responses ranging from 1 = no freedom at all to 5 = a great deal of freedom; (2) how much does your job allow you to make a lot of decisions on your own? (3) how much does your job allow you to take part in making decisions that affect you? with responses ranging from 1 = never to 5 = almost all the time; (4) how much say do you have over what happens on your job? with responses ranging from 1 = none at all to 5 = a great deal.

Routinization—the degree to which job is repetitive—was measured by five items: (1) to what extent does your job require that you keep learning new things? 1 = always to 5 = never; (2) how often do you get to do a number of different things on your job? 1 = always to 5 = never; (3) to what extent does your job require a high level of skill? 1 = very high to 5 = very low; (4) to what extent does your job require that you do the same things over and over again? 1 = never to 5 = always; and (5) how creative does your job require that you be? 1 = very to 5 = no creativity required.

Instrumental communication—the degree to which an organization transmits information concerning the job—was measured by eight items: how well informed are you by the hospital about each of the following aspects of your job? (1) what is to be done, (2) standard operating procedures, (3) what is most important about the job, (4) how well the job is done, (5) what you need to know to do the job, (6) nature of equipment used, (7) how you are supposed to do the job, and (8) rules and regulations. Response categories ranged from 1 = not informed at all to 5 = very well informed.

Promotional opportunity^a—the degree of opportunity for upward movement in an organization's hierarchy of authority—was measured by five items: how much do you agree or disagree with each of the following statements about promotional opportunities for a person with your qualifications somewhere in the hospital? (1) promotions are regular, (2) I'm in a dead-end job, (3) there is an opportunity for advancement, (4) there is a good opportunity for advancement, and (5) there is a good chance to get ahead.

Organizational size was measured by one item, originally coded as the number of beds in a hospital, but recoded as 0 = under 100 beds and 1 = between 100 and 500 beds.

Pay was measured by one item: what is your total yearly income at the present time from the hospital before taxes and other deductions are made? 1 = less than \$5,000, 2 = \$5,000–\$7,499, 3 = \$7,500–\$9,999, 4 = \$10,000–\$12,499, 5 = \$12,500–\$14,999, 6 = \$15,000–\$19,999, 7 = \$20,000–\$24,999, 8 = \$25,000 or over.

Distributive justice—the relationship between inputs to job performance and rewards dispensed by an organization—was measured by four items: when compared to other employees in the hospital where you work, how do you rate the fairness with which you have been treated by

your hospital in the distribution of the following rewards? (1) amount of money directly received, (2) fringe benefits; when compared to other employees who do not work in hospitals, how do you rate the fairness with which you have been treated by your hospital in the distribution of the following rewards? (3) amount of money directly received, (4) fringe benefits. Response categories ranged from 1 = no fairness to 5 = very fair.

Integration—the degree to which an employee has close friends in an immediate work unit—was measured by three items: (1) what would you say about the atmosphere in your immediate work group in terms of friendliness? from 1 = not friendly at all to 5 = very friendly; (2) to what extent do people in your immediate work group help you find ways to do a better job? (3) to what extent do you discuss personal problems with individuals in your immediate work group? Response categories for items 2 and 3 were 1 = never to 5 = very often.

Role overload was measured by one item: how heavy was your work load during the past three months? with 1 = often not enough to keep me busy, 2 = sometimes not enough to keep me busy, 3 = just about the right amount, 4 = hard to keep up with, 5 = entirely too much for me to handle. Because relationships with satisfaction and commitment were nonlinear, we recoded response categories 1, 2, 4, and 5 as 1, and recoded 3 as 0.

Work involvement^a—the degree to which an employee is committed to high standards of occupational performance—was measured by four items: Listed below are some statements about different views toward a person's job. Please indicate the extent of your agreement or disagreement with each statement: (1) you can measure a person pretty well by how good a job he/she does, (2) I'm really a perfectionist about my job, (3) I feel particularly annoyed when other people do poor quality work, (4) sloppy work by anyone makes me very angry.

Length of service was measured by one item: how long have you worked in this hospital? 1 = less than 6 months, 2 = 6 months–1 year, 3 = 1–2 years, 4 = 3–5 years, 5 = 6–10 years, 6 = 11–15 years, 7 = more than 15 years. Years of service were assigned as category midpoints.

Education was measured by one item: how much schooling have you had? 1 = some grade school to 6 = completed college or other higher school. Years of schooling were assigned as category midpoints.

Turnover experience was measured by one item: in the past five years, how many places have you worked? 1 = one, 2 = two, 3 = three, 4 = four or five, 5 = six or more.

Employment opportunity—the availability of alternative jobs outside the organization—was measured by one item: how easy would it be for you to find a job with another employer in this geographical area that is as good as the one you now have? 1 = very difficult to 5 = very easy.

Kinship responsibility—obligations to relatives in the local community—was the sum of four items: (1) marital status, 0 = not married, 1 = married; (2) presence of children 21 or younger in the home, 0 = none, 1 = one, 2 = two or more; (3) presence of own relatives within 50 miles, 0 = none, 1 = one or more; (4) presence of spouse's relatives within 50 miles, 0 = none, 1 = one or more.

^a The response categories for the items used to measure these variables ranged from 1 = strongly disagree to 5 = strongly agree.

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SOUTHERN—November 4-7, New Orleans Hilton, New Orleans, Louisiana
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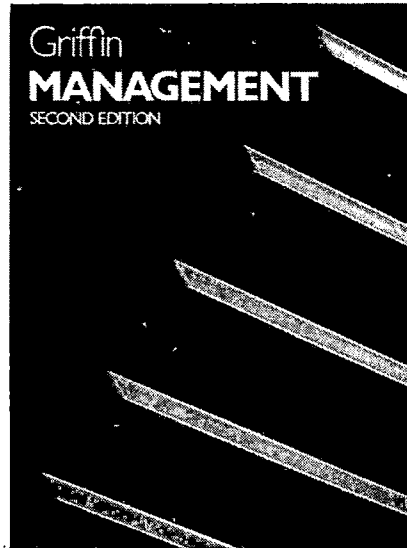
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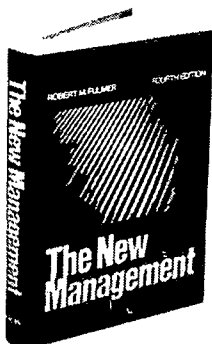
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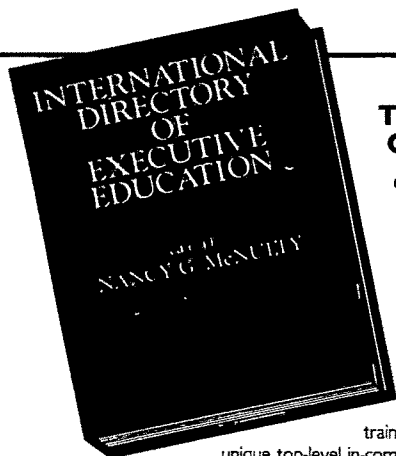
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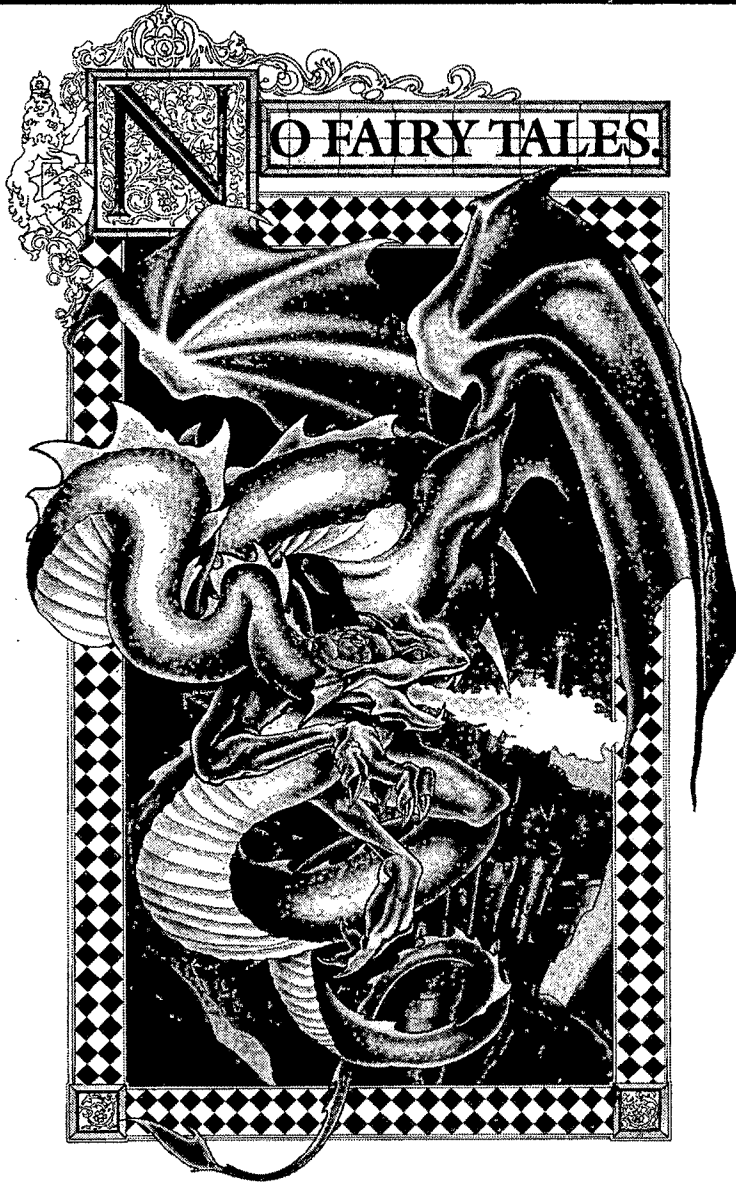
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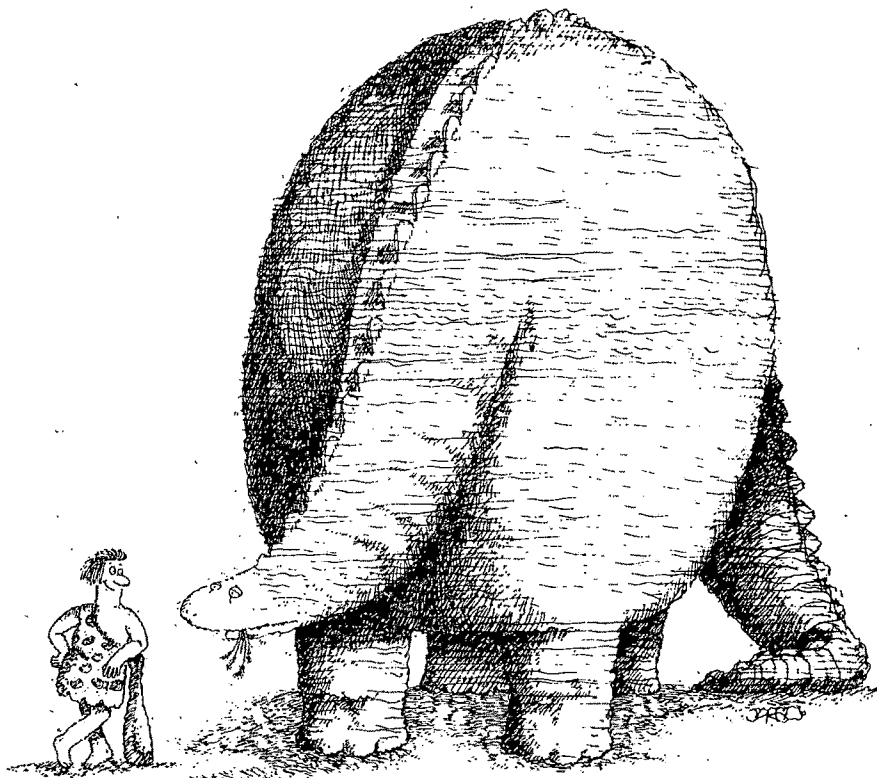
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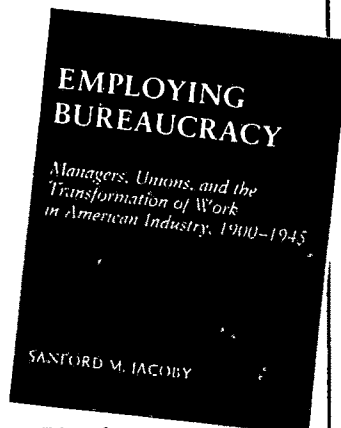
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Call for Nominations
1987 Award for Scholarly Contributions to Management
1987 George R. Terry Book Award

In 1980, the Academy's Board of Governors endorsed the establishment of a formal program of national awards to enhance and recognize professional and academic achievements in the field of management. Two such awards have been established.

Award for Scholarly Contributions to Management

1. This award will be granted on an annual basis for significant scholarly contributions that have advanced management knowledge and practice.
2. Such contributions are defined to include the creation and dissemination of new knowledge in the form of empirical or theoretical developments.
3. Significant scholarly contributions may take the form of conceptual, theoretical, or empirical developments having significant impact on management knowledge and practice.
4. Nominees need not belong to the Academy of Management.
5. The award winner will receive an appropriate form of tangible recognition at the Academy's annual meeting.
6. Nomination forms should be obtained from the Chair of the Awards Committee (address listed below) prior to February 1. Completed nomination forms must be submitted to the Chair of the Committee by March 1, 1987.

George R. Terry Book Award

1. This award will be granted annually to that book judged to have made the most outstanding contribution to the advancement of management knowledge during 1986.
2. Works developed and generally recognized as textbooks are ineligible.
3. Works that contribute to the advancement of management theory, conceptualization, research, or practice are eligible.
4. The recipient(s) of this award will receive an appropriate form of tangible recognition at the Academy's annual meeting.
5. Nominations from publishers are welcome.
6. Nomination forms should be obtained from the Chair of the Awards Committee (address listed below) prior to February 1. Completed nomination forms must be submitted to the Chair of the Committee by March 1, 1987.

Chair of Awards Committee (1987):

Professor Herb Heneman
School of Business
University of Wisconsin
Madison, WI 53706